PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Metal lath and accessories.
2. Portland cement plaster.

1.3 REFERENCE DOCUMENTS

A. ASTM A641/A41M Specification for zinc coated (Galvanized) Carbon Steel.

B. ASTM 653/A653M Specification for Steel Sheet, zinc coated (Galvanized) or zinc-iron alloy coated (Galvannealed) by hot dipped process.

C. ASTM C847 Specification for metal lath, and ASTM C 841 for plaster accessories.

D. ASTM C926 Specification for application of portland cement based plaster.

E. ASTM C594 Specification for Steel Drill Screws for application of Gypsum of gypsum panel products or metal plaster bases to steel studs from 0.033 inches to 0.112 inches in thickness.

F. ASTM C1002 Specification for steel self piercing tapping screws for application of gypsum panel products or metal plaster bases to wood studs or steel studs.

G. ASTM C1063 Specification for installation of lathing and Furring to receive Interior and Exterior Portland Cement based Plaster.

1.4 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each product specified.

C. Material Certificates: Submit certificate signed by manufacturer for each kind of plaster aggregate certifying that materials comply with requirements.

1.5 QUALITY ASSURANCE

A. Mockups: Prior to installing plaster work, construct panels for each type of finish and application required to verify selections made under Sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final unit of Work.

1. Locate mockups on-site in the location and of the size indicated or, if not indicated, as directed by Architect.
2. Erect mockups 48 by 48 inches by full thickness in presence of Architect using materials, including lath, support system, and control joints, indicated for final Work.
3. Notify Architect 7 days in advance of the dates and times when mockups will be constructed.
4. Demonstrate the proposed range of aesthetic effects and workmanship.
5. Obtain Architect's approval of mockups before start of plaster Work.
6. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Portland cement plaster Work.

a. When directed, remove mockups from Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver cementitious materials to Project site in original packages, containers, or bundles, labeled with manufacturer's name, product brand name, and lot number.

B. Store materials inside, under cover, and dry, protected from weather, direct sunlight, surface contamination, aging, corrosion, and damage from construction traffic and other causes.

1.7 PROJECT CONDITIONS

A. Environmental Requirements, General: Comply with requirements of referenced plaster application standards and recommendations of plaster manufacturer for environmental conditions before, during, and after plaster application.

B. Cold-Weather Requirements: Provide heat and protection, temporary or permanent, as required to protect each coat of plaster from freezing for at least 24 hours after application. Distribute heat uniformly to prevent concentration of heat on plaster near heat sources; provide deflection or protective screens.

C. Warm-Weather Requirements: Protect plaster against uneven and excessive evaporation and from strong flows of dry air, both natural and artificial. Apply and cure plaster as required by climatic and job conditions to prevent dry out during cure period. Provide suitable coverings, moist curing, barriers to deflect sunlight and wind, or combinations of these, as required.

D. Exterior Plaster Work: Do not apply plaster when ambient temperature is below 40 deg F.

E. Exterior Plaster Work: Protect plaster against freezing when ambient temperature is below 40 deg F by heating materials and providing temporary protection and heat as required by ACI 306R.

F. Protect contiguous work from soiling and moisture deterioration caused by plastering. Provide temporary covering and other provisions necessary to minimize harmful spattering of plaster on other work.

PART 2 - PRODUCTS

2.1 LATH

A. Expanded-Metal Lath: Comply with ASTM C 847 for material, type, configuration, and other characteristics indicated below.

1. Material: Fabricate expanded-metal lath from sheet metal conforming to the following:

a. Zinc-Coated Steel: Structural-quality, zinc- coated (galvanized) steel sheet complying with ASTM A 653, G60 minimum coating designation, unless otherwise indicated.

2. Diamond-Mesh Lath: Comply with the following requirements:

a. Configuration: Self-furring.

1) Weight: 3.4 lb/sq. yd. (1.8 kg/sq. m).

B. Paper Backing: Provide the following material factory bonded to back of all metal lath. Comply with FS UU-B-790a, Type I, grade and style as indicated below:

1. Vapor-Permeable Paper: Grade D, Style 2.

2.2 SHEATHING AND ACCESSORIES

A. General: Comply with material provisions of ASTM C 1063 and the requirements indicated below; coordinate depth of accessories with thicknesses and number of plaster coats required.

B. Sheathing Under Stucco: Georgia-Pacific, DensGlass Sheathing 1/2 inch 5/8 inch Type X minimum thickness as illustrated in the drawings. Exterior Sheathing or approved equivalent conforming to:
1. ASTM-E136 for noncombustible materials.
2. ASTM C79 and C1396 standards for humidified deflection.
3. ASTM C1177 Exterior sheathing.

C. Metal Corner Reinforcement: Expanded, large-mesh, diamond-metal lath fabricated from 0.0475-inch-diameter, zinc-coated (galvanized) wire and specially formed to reinforce external corners of Portland cement plaster on exterior exposures while allowing full plaster encasement.

D. Casing Beads: Square-edged style, with expanded flanges of the following material:

1. Zinc Coated (Galvanized): Minimum 0.0172 inch thick.

E. Control Joints: Prefabricated, of material and type indicated below:

1. Zinc Coated (Galvanized): Minimum 0.0172 inch thick.
2. One-Piece Type: Folded pair of non-perforated screeds in double V-shaped configuration, with expanded or perforated flanges.

a. Provide removable protective tape on plaster face of control joints.

3. Aluminum control joint reveal, ½" wide type where indicated on elevation drawings.

F. Foundation Sill (Weep) Screed: Manufacturer's standard profile designed for use at sill plate line to form plaster stop and prevent plaster from contacting damp earth, fabricated from zinc-coated (galvanized) steel sheet 0.0172 inches thick minimum..

G. Reveal and Vent Screeds:

1. 1. Zinc Coated (Galvanized): Minimum 0.0172 inch thick.

H. Lath Attachment Devices: Material and type required by ASTM C 1063 for installations indicated.

2.3 PLASTER MATERIALS

A. Base-Coat Cements: Type as indicated below:

1. Portland cement, ASTM C 150, Type II.

B. Job-Mixed Finish-Coat Cement: Material and color as indicated below:

1. Portland cement, ASTM C 150, Type II.

C. Cement Color: Gray.

1. Provide white for finish coat.

D. Lime: Special hydrated lime for finishing purposes, ASTM C 206, Type S; or special hydrated lime for masonry purposes, ASTM C 207, Type S.

E. Sand Aggregate for Base Coats: ASTM C 897.

F. Aggregate for Finish Coats: ASTM C 897 system and as indicated below:

1. Manufactured or natural sand, in color matching Architect's sample.

2.4 MISCELLANEOUS MATERIALS

A. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch long, free of contaminates, manufactured for use in Portland cement plaster.

B. Water for Mixing and Finishing Plaster: Potable.

C. Line Wire: 0.0475-inch-diameter, zinc-coated (galvanized), soft, annealed steel wire.

2.5 PLASTER MIXES AND COMPOSITIONS

A. General: Comply with ASTM C 926 for base- and finish-coat mixes as applicable to plaster bases, materials, and other requirements indicated.

B. Base-Coat Mixes and Compositions: Proportion materials for respective base coats in parts by volume per sum of cementitious materials for aggregates to comply with the following requirements for each method of application and plaster base indicated. Adjust mix proportions below within limits specified to attain workability.

C. Fiber Content: Add fiber to following mixes after ingredients have mixed at least 2 minutes. Comply with fiber manufacturer's written instructions but do not exceed 1 lb/cu. ft. of cementitious materials. Reduce aggregate quantities accordingly to maintain workability.

D. Three-Coat Work over Metal Lath (Table 1 and 2, ASTM C926): Either pair of base-coat proportions as indicated below:

1. Scratch Coat: 1 part Portland cement, 0 to 3/4 parts lime, 2-1/2 to 4 parts aggregate.
2. Brown Coat: 1 part Portland cement, 0 to 3/4 parts lime, 3 to 5 parts aggregate.

OR

3. Scratch Coat: 1 part masonry cement, 2-1/2 to 4 parts aggregate.
4. Brown Coat: 1 part masonry cement, 3 to 5 parts aggregate.

E. Two-Coat Work over Concrete Unit Masonry (Table 1 and 2, ASTM C926): Base-coat proportions as indicated below:

1. Base Coat: 1 part Portland cement, 3/4 to 1-1/2 parts lime, 3 to 4 parts aggregate.
2. Base Coat: 1 part masonry cement, 3 to 4 parts aggregate.

OR

3. Base Coat: 1 part plastic cement, 3 to 4 parts aggregate.

F. Job-Mixed Finish Coats: Proportion materials for finish coats in parts by volume for cementitious materials and parts by volume per sum of cementitious materials to comply with the following requirements:

1. Either proportions using sand aggregates as indicated below:

a. 1 part Portland cement, 3/4 to 1-1/2 parts lime, 3 parts sand.
b. 1 part masonry cement, 1-1/2 parts sand.

2.6 MIXING

A. Mechanically mix cementitious and aggregate materials for plasters to comply with applicable referenced application standard and with recommendations of plaster manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION OF LATH - GENERAL

A. Standards: Comply with ML/SFA 920, "Guide Specifications for Metal Lathing and Furring," and with requirements of ASTM C 1063.

B. Install supplementary framing, blocking, and bracing at terminations in work and for support of fixtures, equipment services, heavy trim, grab bars, handrails, furnishings, and similar work to comply with details indicated or, if not otherwise indicated, to comply with applicable written instructions of lath and furring manufacturer.

C. Isolation: Where lathing and metal support system abuts building structure horizontally and where partition or wall abuts overhead structure, sufficiently isolate from structural movement to prevent transfer of loading from building structure. Install slip- or cushion-type joints to absorb deflections but maintain lateral support.

1. Frame both sides of control joints independently and do not bridge joints with furring and lathing or accessories.

D. Install additional framing, runners, lath, and beads, as required to form openings and frames for other work as indicated. Coordinate support system for proper support of framed work that is not indicated to be supported independently of metal furring and lathing system.

3.2 INSTALLATION OF SOFFIT SUSPENSION SYSTEMS

A. Preparation and Coordination: Coordinate installation of ceiling suspension system with installation of overhead structural systems to ensure inserts and other structural anchorage provisions have been installed to receive ceiling hangers in a manner that will develop their full strength and at spacing required to support ceiling.

B. Hanger Installation: Attach hangers to structure above to comply with ML/SFA 920, "Guide Specifications for Metal Lathing and Furring," and with referenced standards.

C. Install soffit suspension system components of sizes and spacing indicated, but not in smaller sizes or greater spacing than those required by referenced lathing and furring installation standards. Installer shall provide a letter, signed and sealed, from a registered engineer that the installation meets wind uplift requirements.

1. Wire Hangers: Space 0.16-inch-diameter wire hangers not over 48 inches o.c., parallel with and not over 36 inches perpendicular to direction of carrying channels, unless otherwise indicated, and within 6 inches of carrying channel ends.
2. Carrying Channels: Space carrying channels not over 36 inches o.c. with 48-inch o.c. hanger spacing.
3. Furring Channels to Receive Metal Lath: Space furring channels not over 16 inches o.c. for 3.4-lb/sq. yd. diamond-mesh lath, 19 inches o.c. for 3.4-lb/sq. yd. flat rib lath, or 24 inches o.c. for 3.4-lb/sq. yd., 3/8-inch rib lath.

3.3 LATHING

A. Install metal lath for the following applications where plaster base coats are required. Provide appropriate type, configuration, and weight of metal lath selected from materials indicated that comply with referenced ML/SFA specifications and ASTM lathing installation standards.
   1. Exterior sheathed wall surfaces using 3.4-lb/sq. yd. minimum weight, self-furring, paper-backed diamond-mesh lath.

3.4 PREPARATIONS FOR PLASTERING

A. Install temporary grounds and screeds to ensure accurate rodding of plaster to true surfaces; coordinate with scratch-coat work.

B. Refer to Division 6 Sections for installing permanent wood grounds, if any.

C. Flashing: Refer to Division 7 Sections for installing flashing as indicated.

3.5 INSTALLATION OF PLASTERING ACCESSORIES

A. General: Comply with referenced lathing and furring installation standards for provision and location of plaster accessories of type indicated. Miter or cope accessories at corners; install with tight joints and in alignment. Attach accessories securely to plaster bases to hold accessories in place and in alignment during plastering. Install accessories of type indicated at following locations:

   1. External Corners: Install corner reinforcement at external corners.
   2. Terminations of Plaster: Install casing beads, unless otherwise indicated.
   3. Control Joints: Install at locations indicated or, if not indicated, at locations complying with the following criteria and approved by Architect:

      a. Where an expansion or contraction joint occurs in surface of construction directly behind plaster membrane.
      b. Distance between Control Joints: Not to exceed 18 feet in either direction or a length-to-width ratio of 2-1/2 to 1.
      c. Wall Areas: Not more than 144 sq. ft..
      d. Horizontal Surfaces: Not more than 100 sq. ft. in area.
      e. Where plaster panel sizes or dimensions change, extend joints full width or height of plaster membrane.

3.6 PLASTER APPLICATION

A. Plaster Application Standard: Apply plaster materials, composition, and mixes to comply with ASTM C 926.

B. Do not use materials that are frozen, caked, lumpy, dirty, or contaminated by foreign materials.

C. Do not use excessive water in mixing and applying plaster materials.

D. Flat Surface Tolerances: Do not deviate more than plus or minus 1/8 inch in 10 feet from a true plane in finished plaster surfaces, as measured by a 10-foot straightedge placed at any location on surface.

E. Grout hollow-metal frames, bases, and similar work occurring in plastered areas, with base-coat plaster material, and before lathing where necessary. Except where full grouting is indicated or required for fire-resistance rating, grout at least 6 inches at each jamb anchor.

F. Sequence plaster application with installation and protection of other work so that neither will be damaged by installation of other.

G. Plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground, unless otherwise indicated. Where interior plaster is not terminated at metal frame by casing beads, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.

H. Corners: Make internal corners and angles square; finish external corners flush with cornerbeads on interior work, square and true with plaster faces on exterior work.

I. Number of Coats: Apply plaster of composition indicated, to comply with the following requirements:

1. Three Coats (ASTM C926, Table 1): Over the following plaster base:

a. Metal lath.

2. Two Coats (ASTM C926, Table 1): Over the following plaster bases:

a. Concrete unit masonry.
b. Concrete, when surface conditions comply with ASTM C926 for plaster bonded to solid bases.

J. Finish Coats: Apply finish coats to comply with the following requirements:

1. Float Finish: Apply finish coat to a minimum thickness of 1/8 inch to completely cover base coat, uniformly floated to a true even plane with fine-textured finish matching Architect's sample.

K. Moist-cure plaster base and finish coats to comply with ASTM C 926, including written instructions for time between coats and curing in "Annex A2 Design Considerations."

3.7 CUTTING AND PATCHING

A. Cut, patch, replace, repair, and point up plaster as necessary to accommodate other work. Repair cracks and indented surfaces. Point-up finish plaster surfaces around items that are built into or penetrate plaster surfaces. Repair or replace work to eliminate blisters, buckles, check cracking, dry outs, efflorescence, excessive pinholes, and similar defects. Repair or replace work as necessary to comply with required visual effects.

3.8 CLEANING AND PROTECTING

A. Remove temporary covering and other provisions made to minimize spattering of plaster on other work. Promptly remove plaster from door frames, windows, and other surfaces not to be plastered. Repair surfaces stained, marred or otherwise damaged during plas-

tering work. When plastering work is completed, remove unused materials, containers, equipment, and plaster debris.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, to ensure plaster work is without damage or deterioration at the time of Substantial Completion.

END SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

A. This section includes the following:

1. Nonload-bearing steel framing members for gypsum board assemblies.
2. Gypsum board assemblies attached to steel framing.

B. Related Sections: The following sections contain requirements that relate to this section:

1. Division 5, Section 05400 – "COLD-FORMED METAL FRAMING" for load-bearing steel framing.
2. Division 7, Section 07920 – "JOINT SEALANTS" for acoustical sealants.

1.3 DEFINITIONS

A. Gypsum Board Construction Terminology: Refer to ASTM C11 and GA-505 for definitions of terms for gypsum board assemblies not defined in this section or in other referenced standards.

1.4 ASSEMBLY PERFORMANCE REQUIREMENTS

A. Sound Transmission Characteristics: For gypsum board assemblies with STC ratings, provide materials and construction identical to those of assemblies whose STC ratings were determined according to ASTM E90 and classified according to ASTM E413 by a qualified independent testing agency.

B. Fire Resistance: Provide gypsum board assemblies with fire-resistance ratings indicated.

1.5 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each type of product specified.

C. Shop Drawings showing locations, fabrication, and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other units of work.

1.6 QUALITY ASSURANCE

A. Single-Source Responsibility for Steel Framing: Obtain steel framing members for gypsum bard assemblies from a single manufacturer, unless otherwise indicated.

B. Single-Source Responsibility for Panel Products: Obtain each type of gypsum board and other panel products from a single manufacturer.

C. Single-Source Responsibility for Finishing Materials: Obtain finishing materials from either the same manufacturer that supplies gypsum board and other panel products or from a manufacturer acceptable to gypsum board manufacturer.

D. Fire-Test-Response Characteristics: Where fire-resistance-rated gypsum board assemblies are indicated, provide gypsum board assemblies which are identical to assemblies tested for fire resistance according to ASTM E119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: As indicated by design designations in UL "Fire Resistance Directory" or in the listing of another testing and inspecting agency acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Neatly stack gypsum panels flat to prevent sagging.

1. Handle gypsum board to prevent damage to edges, ends and surfaces. Do not bend or otherwise damage metal corner beads and trim.

1.8 PROJECT CONDITIONS

A. Environmental Conditions, General: Establish and maintain environmental conditions for applying and finishing gypsum board to comply with ASTM C840 requirements or gypsum board manufacturer's recommendations, whichever are more stringent.

B. Room Temperatures: For installation of gypsum board to framing, maintain not less than 40 degrees F. For gypsum board finishing, maintain not less than 50 degrees F for 48 hours before application and continuously after until dry. Do not exceed 95 degrees F when using temporary heat sources.

C. Ventilation: Ventilate building spaces as required to dry joint treatment materials. Avoid drafts during hot, dry weather to prevent finishing materials from drying too rapidly.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Steel Framing and Furring:

a. Dale Industries, Inc.
b. Dietrich Industries, Inc.
c. Marino/Ware.
d. National Gypsum Co.; Gold Bond Building Products Division.
e. Unimast, Inc.
f. United States Gypsum Co.

2. Grid Suspension Assemblies:

a. Armstrong World Industries, Inc.
b. Chicago Metallic Corp.
c. USG Interiors, Inc.
d. Worthington Steel Company (formerly National Rolling Mills).

3. Gypsum Board and Related Products:

a. Georgia-Pacific Corp.
b. National Gypsum Co.; Gold Bond Building Products Division.
c. United States Gypsum Co.

2.2 STEEL FRAMING FOR WALLS AND PARTITIONS

A. General: Provide steel framing member complying with the following requirements:

1. Protective Coating: ASTM A653, G40 hot-dip galvanized coating for framing members attached to and within 10 feet of exterior walls.

B. Steel Studs and Runners: ASTM C645, with flange edges of studs bent back 90 degrees and doubled over to form 3/16-inch-wide minimum lip (return), and complying with the following requirements for minimum thickness of base (uncoated) metal and for depth:

1. Thickness:
   a. 0.0179 inch (25 gauge), where indicated. These should be used only where "Fiberock" is not installed.
   b. 0.0359 inch (20 gauge) unless otherwise indicated. These should be installed in any location where "Fiberock" is used and where heights of walls require increased gauge.

2. Depth:
   a. 3-5/8 inches, unless otherwise indicated.
   b. 6 inches, where indicated.

C. Steel Rigid Furring Channels: ASTM C645, hat shaped, depth and minimum thickness of base (uncoated) metal as follows:

1. Thickness:
   a. 0.0179 inch (25 gauge), for 25 gauge studs
   b. 0.0359 inch (20 gauge) for 20 gauge studs.
2. Depth: 7/8 inch.

D. Z-Furring Members: Manufacturer's standard Z-shaped furring members with slotted or nonslotted web, fabricated from steel sheet complying with ASTM A653 or ASTM A568; with a minimum base metal (uncoated) thickness of 0.0179 inch, face flange of 1-1/4 inch, wall-attachment flange of 7/8 inch, and of depth required to fit insulation thickness indicated.

E. Fasteners for Metal Framing: Provide fasteners of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel framing and furring members securely to substrates involved; complying with the recommendations of gypsum board manufacturers for applications indicated.

2.3 GYPSUM BOARD PRODUCTS

A. General: Provide gypsum board of types indicated in maximum lengths available that will minimize end-to-end butt joints in each area indicated to receive gypsum board application.

1. Widths: Provide gypsum board in widths of 48 inches.

B. Gypsum Wallboard: ASTM C36 and as follows:

1. Type: Regular for vertical surfaces, unless otherwise indicated.
2. Type: Type X where required for fire-resistance-rated assemblies.
3. Type: Sag-resistant type for ceiling surfaces.
4. Edges: Tapered.
5. Thickness: 5/8 inch, unless otherwise indicated on drawings.

C. Gypsum Board Base Layer(s) for Multilayer Applications: Gypsum wallboard, ASTM C36, and as follows:

1. Type: Regular for vertical surfaces, unless otherwise indicated.
2. Type: Type X where indicated or required for fire-resistance-rated assemblies.
3. Type: Sag-resistant type for ceiling surfaces, unless otherwise indicated.
4. Edges: Manufacturer's standard.
5. Thickness: 5/8 inch, unless otherwise indicated on drawings.

D. Water-Resistant Gypsum Backing Board: ASTM C630 and as follows:

1. Type: Regular, unless otherwise indicated.

2. Type: Type X where required for fire-resistance-rated assemblies and where indicated.
3. Thickness: 5/8 inch, unless otherwise indicated on drawings.

E. Fiber Reinforced Gypsum Board: ASTM C 1278 and ASTM C 36

1. Type: High Density, Very High Impact Wall Panels, unless otherwise indicated.
2. Edges: Manufacturer's standard.
3. Thickness: 5/8 inch, unless otherwise indicated on drawings.
4. Product: Fiberock VHI wall panels by United States Gypsum Co. or approved equal.

2.4 TRIM ACCESSORIES

A. Accessories for Interior Installation: Corner bead, edge trim, and control joints complying with ASTM C1047 and requirements indicated below:

1. Material: Formed metal or plastic, with metal complying with the following requirement:
2. Steel sheet zinc coated by hot-dip process or rolled zinc.

B. Shapes indicated below by reference to Fig. 1 designations in ASTM C1047:

1. Corner bead on outside corners, unless otherwise indicated.
2. LC-bead with both face and back flanges; face flange formed to receive joint compound. Use LC-beads for edge trim, unless otherwise indicated.
3. L-bead with face flange only; face flange formed to receive joint compound. Use L-bead where indicated.
4. U-bead with face and back flanges; face flange formed to be left without application of joint compound. Use U-bead where indicated.
5. One-piece control joint formed with V-shaped slot and removable strip covering slot opening.

2.5 JOINT TREATMENT MATERIALS

A. General: Provide joint treatment materials complying with ASTM C475 and the recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.

B. Joint Tape for Gypsum Board: Paper reinforcing tape, unless otherwise indicated.

1. Use pressure-sensitive or staple-attached, open-weave, glass-fiber reinforcing tape with compatible joint compound where recommended by manufacturer of gypsum board and joint treatment materials for application indicated.

C. Setting-Type Joint Compounds for Gypsum Board: Factory-packaged, job-mixed, chemical-hardening powder products formulated for uses indicated.

1. Where setting-type joint compounds are indicated as a taping compound only or for taping and filling only, use formulation that is compatible with other joint compounds applied over it.

D. For prefilling gypsum board joints, use formulation recommended by gypsum board manufacturer.

E. For filling joints and treating fasteners of water-resistant gypsum backing board behind base for ceramic tile, use formulation recommended by gypsum board manufacturer.

F. Drying-Type Joint Compounds for Gypsum Board: Factory-packaged vinyl-based products complying with the following requirements for formulation and intended use.

1. Ready-Mixed Formulation: Factory-mixed product.

a. Topping compound formulated for fill (second) and finish (third) coats.

2.6 MISCELLANEOUS MATERIALS

A. General: Provide auxiliary materials for gypsum board construction that comply with referenced standards and recommendations of gypsum board manufacturer.

B. Spot Grout: ASTM C475, setting-type joint compound recommended for spot-grouting hollow metal door frames.

C. Steel drill screws complying with ASTM C1002 for the following applications:

1. Fastening gypsum board to steel members less than 0.033 inch thick.
2. Fastening gypsum board to gypsum board.

D. Steel drill screws complying with ASTM C954 for fastening gypsum board to steel members from 0.033 to 0.112 inch thick.

E. Asphalt-Saturated Organic Felt: ASTM D226, Type I (No. 15 asphalt felt), nonperforated.

F. Foam Gaskets: Closed-cell vinyl foam adhesive-backed strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit metal stud size indicated.

G. Sound-Attenuation Blankets: Unfaced mineral-fiber blanket insulation produced by combining mineral fibers of type described below with thermosetting resins to comply with ASTM C665 for Type I (blankets without membrane facing).

1. Mineral-Fiber Type: Fibers manufactured from glass.

H. Thermal Insulation: Material indicated below, of thickness and width to fill voids formed by Z-furring members:

1. Unfaced Mineral-Fiber Blanket Insulation: Unfaced mineral-fiber blanket insulation produced by combining mineral fibers of type described below with thermosetting resins to comply with ASTM C665 for Type I (blankets without membrane facing).

a. Mineral-Fiber Type: Fibers manufactured from glass.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to which gypsum board assemblies attach or abut, installed hollow metal frames, cast-in-anchors, and structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of assemblies specified in this section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Ceiling Anchorages: Coordinate installation of ceiling suspension systems with installation of overhead structural assemblies to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers that will develop their full strength and at spacing required to support ceilings.

1. Furnish concrete inserts and other devices indicated to other trades for installation well in advance of time needed for coordination with other construction.

3.3 INSTALLING STEEL FRAMING - GENERAL

A. Steel Framing Installation Standard: Install steel framing to comply with ASTM C754 and with ASTM C840 requirements that apply to framing installation.

B. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Comply with details indicated and with recommendations of gypsum board manufacturer or, if none available, with United States Gypsum Co.'s "Gypsum Construction Handbook."

C. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement. Comply with details shown on Drawings.

1. Where building structure abuts ceiling perimeter or penetrates ceiling.
2. Where partition framing and wall furring abut structure, except at floor.

D. Do not bridge building control and expansion joints with steel framing or furring members. Independently frame both sides of joints with framing or furring members as indicated.

3.4 INSTALLING STEEL FRAMING FOR WALLS AND PARTITIONS

A. Install runners (tracks) at floors, ceilings, and structural walls and columns where gypsum board stud assemblies abut other construction.

1. Where studs are installed directly against exterior walls, install asphalt felt strips or foam gaskets between studs and wall.

B. Installation Tolerances: Install each steel framing and furring member so that fastening surfaces do not vary more than 1/8 inch from the plane formed by the faces of adjacent framing.

C. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.

1. For STC-rated and fire-resistance-rated partitions that extend to the underside of floor/roof slabs and decks or other continuous solid structural surfaces to obtain ratings, install framing around structural and other members extending below floor/roof slabs and decks, as needed, to support gypsum board closures needed to make partitions continuous from floor to underside of solid structure.

D. Install steel studs and furring in sizes and at spacing indicated, but not less than that required by referenced installation standards.

1. Single-Layer Construction: Space studs 16 inches (406 mm) o.c., unless otherwise indicated.
2. Where partitions support wall cabinets, space studs a maximum of 12 inches (305 mm) o.c.

E. Install steel studs so flanges point in the same direction and leading edge or end of each gypsum board panel can be attached to open (unsupported) edges of stud flanges first.

F. Frame door openings to comply with GA-219, and with applicable published recommendations of gypsum board manufacturer, unless otherwise indicated. Attach vertical studs at jambs with screws either directly to frames or to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

1. Extend jamb studs through suspended ceilings and attach to underside of floor or roof structure above.

G. Frame openings other than door openings to comply with details indicated or, if none indicated, as required for door openings. Install framing below sills of openings to match framing required above door heads.

3.5 APPLYING AND FINISHING GYPSUM BOARD - GENERAL

A. Gypsum Board Application and Finishing Standards: Install and finish gypsum panels to comply with ASTM C840 and GA-216.

B. Install sound-attenuation blankets, where indicated, prior to installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

C. Install wall/partition board panels to minimize the number of abutting end joints or avoid them entirely. Stagger abutting end joints not less than one framing member in

alternate courses of board. At high walls, install panels horizontally with end abutting joints over studs and staggered.

D. Install gypsum panels with face side out. Do not install imperfect, damaged, or damp panels. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

E. Locate both edge or end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Position adjoining panels so that tapered edges abut tapered edges and field-cut edges abut field-cut edges and ends. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Avoid joints other than control joints at corners of framed openings where possible.

F. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

G. Attach gypsum panels to framing provided at openings and cutouts.

H. Spot grout hollow metal door frames for solid-core wood doors, hollow metal doors, and doors over 32 inches wide. Apply spot grout at each jamb anchor clip and immediately insert gypsum panels into frames.

I. Form control and expansion joints at locations indicated and as detailed, with space between edges of adjoining gypsum panels, as well as supporting framing behind gypsum panels and prepared to receive trim accessories.

J. Cover both faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases that are braced internally.

1. Except where concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect open concrete coffers, concrete joists, and other structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by coffers, joists, and other structural members; allow 1/4- to 1/2-inch-wide joints to install sealant.

K. Isolate perimeter of nonload-bearing gypsum board partitions at structural abutments, except floors, as detailed. Provide 1/4- to 1/2-inch-wide spaces at these locations and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

L. Where STC-rated gypsum board assemblies are indicated, seal construction at perimeters, behind control and expansion joints, openings, and penetrations with a continuous bead of acoustical sealant including a bead at both faces of the partitions. Comply with ASTM C919 and manufacturer's recommendations for location of edge trim and closing off sound-flanking paths around or through gypsum board assemblies, including sealing partitions above acoustical ceilings.

M. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's recommendations.

3.6 GYPSUM BOARD APPLICATION METHODS

A. Single-Layer Application: Install gypsum wallboard panels as follows:

1. On ceilings, apply gypsum panels prior to wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated, and provide panel lengths that will minimize end joints.

    a. Stagger abutting end joints not less than one framing member in alternate courses of board.
    b. At stairwells and other high walls, install panels horizontally.

3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.

B. Wall Tile Substrates: For substrates indicated to receive thin-set ceramic tile and similar rigid applied wall finishes, comply with the following:

1. Install water-resistant gypsum backing board panels at showers, tubs, and where indicated. Install with 1/4-inch open space where panels abut other construction or penetrations.
2. Install gypsum wallboard panels with tapered edges taped and finished to produce a flat surface except at showers, tubs, and other locations indicated to receive water-resistant panels.

C. Multilayer Application: Install gypsum backing board for base layers and gypsum wall board for face layers.

1. On ceilings, apply for base layers prior to applying base layers on walls/partitions; apply face layers in same sequence. Offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints. Apply base layers at right angles to framing members, unless otherwise indicated.
2. On partitions/walls, apply base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints. Stagger joints on opposite sides of partitions.
3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.

D. Single-Layer Fastening Methods: Apply gypsum panels to supports as follows:

1. Fasten with screws.

E. Multilayer Fastening Methods: Apply base layers of gypsum panels and face layer to base layers as follows:

1. Fasten both base layers and face layers separately to supports with screws.

F. Fiber-reinforced Gypsum Board:

1. Install fiber-reinforced gypsum board in accordance with current published manufacturer's installation instructions and as specified here. When referenced industry standards differ form manufacturer's instructions shall take precedence.

2. When scoring and snapping fiber-board VHI panels, score from the mesh side. Fasten VHI panels with the mesh facing framing members.

3. Examine fasteners. Drive fasteners below the surface of the panel leaving a 1/32" depression in the surface of panels. Prefill openings wider than 1/4."

4. Completely fill the recess formed by the tapered edges of the panel with taping compound.

5. Center joint tape and press into it the taping compound by drawing a knife along the joint at a 45□ angle. Apply sufficient pressure to remove excess taping compound above, below, and at the edges of the joint tape.

6. Leave a sufficient quantity of taping compound under the joint tape to ensure an adequate bond, but no more than 1/32" at the feathered edge.

7. As soon as the joint tape has been embedded, apply a skim coat of taping compound over the joint tape. Allow to dry completely.

8. Fill fastener depressions with taping compound. Remove excess taping compound by wiping it at 60□ angle to the application direction. Allow to dry completely.

9. Butt joints: Apply taping compound over joint and embed joint tape in a manner similar to tapered joints. Leave a sufficient quantity of taping compound under the joint tape to ensure an adequate bond.

10. Corner Beads: Apply a coat of taping compound to corner beads.

11. Inside corners: Fold joint tape along crease to form a 90□ angle. Apply taping compound to both sides of the corner. Apply joint tape by embedding in taping compound.

12. After the taping compound has dried completely, apply additional coats of a high-quality, ready-mix finishing compound until the required level of finish is achieved.

13. Light sand joints with a 220 or 320 grit screen cloth, or smooth with a damp sponge.

14. Do not paint until finish compound coats are completely dry.

3.7 INSTALLING TRIM ACCESSORIES

A. General: For trim accessories with back flanges, fasten to framing with the same fasteners used to fasten gypsum board. Otherwise, fasten trim accessories according to accessory manufacturer's directions for type, length, and spacing of fasteners.

B. Install corner bead at external corners.

C. Install edge trim where edge of gypsum panels would otherwise be exposed. Provide edge trim type with face flange formed to receive joint compound, except where other types are indicated.

1. Install LC-bead where gypsum panels are tightly abutted to other construction and back flange can be attached to framing or supporting substrate.
2. Install L-bead where edge trim can only be installed after gypsum panels are installed.
3. Install U-bead where indicated.

D. Install control joints at locations indicated, and where not indicated according to ASTM C840 and manufacturer's recommendations and in specific locations approved by Architect for visual effect.

3.8 FINISHING GYPSUM BOARD ASSEMBLIES

A. General: Apply joint treatment at gypsum board joints (both directions); flanges of corner bead, edge trim and control joints; penetrations; fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration and levels of gypsum board finish indicated.

B. Prefill open joints, rounded or beveled edges, and damaged areas using setting-type joint compound.

C. Apply joint tape over gypsum board joints, except those with trim accessories having concealed face flanges not requiring taping to prevent cracks from developing in joint treatment at flange edges.

D. Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-214.

1. Level 1 for ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies.
2. Level 2 where water resistant gypsum backing board panels form substrates for tile and where indicated.
3. Level 4 for gypsum board surfaces, unless otherwise indicated.

E. Use the following joint compound combination as applicable to the finish levels specified:

1. Embedding and First Coat: Setting-type joint compound. Fill (Second) Coat: Setting-type joint compound. Finish (Third) Coat: Ready-mixed, drying-type, all-purpose or topping compound.

F. For Level 4 gypsum board finish, embed tape in joint compound and apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects and ready for decoration.

G. Where Level 2 gypsum board finish is indicated, apply joint compound specified for first coat in addition to embedding cost.

H. Where Level 1 gypsum board finish is indicated, apply joint compound specified for embedding coat.

I. Finish water-resistant gypsum backing board forming base for ceramic tile to comply with ASTM C840 and gypsum board manufacturer's directions for treatment of joints behind tile.

CLEANING AND PROTECTION

A. Promptly remove any residual joint compound from adjacent surfaces.

B. Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure gypsum board assemblies are without damage or deterioration at the time of Substantial Completion.

END SECTION

PART 1 GENERAL

1.1 REFERENCE

The publication below forms a part of this specification.

UNDERWRITERS LABORATORY UL 752 9th Edition
Standard for Bullet Resisting Equipment dated Jan. 27,1995
AMERICAN SOCIETY FOR TESTING AND MATERIALS
ASTM E119-00e Standard Test for ONE HOUR FIRE RATING
of building construction and materials.

1.2 SUBMITTALS

The following shall be submitted in accordance with Sections 01340 and the SPECIAL CONTRACT REQUIREMENTS: Submit for approval prior to fabrication catalog cuts, brochures, specifications, UL LISTING VERIFICATION, proof of possession of PRODUCT LIABILITY INSURANCE in an amount not less than five million U.S. dollars, and printed data in sufficient detail to indicate compliance with the contract documents and the manufacturer's instructions for the installation of Bullet Resistant Fiberglass. Furnish verification of compliance with ASTM E119-00e ONE HOUR FIRE RATING from a recognized testing laboratory.

1.3 DESIGN

Through the design, manufacturing technique and material application the Bullet Resistant Fiberglass shall be of the " non-ricochet type ". This design is intended to permit the encapture and retention of an attacking projectile lessening the potential of a random injury or lateral penetration.

1.4 DELIVERY, STORAGE AND HANDLING

Deliver the materials to the project with the manufacturer's UL Labels intact and legible. Handle the material with care to prevent damage. Store the materials inside under cover, stack flat and off the floor.

1.5 WARRANTY

All materials and workmanship shall be warranted against defects for a period of two (2) year from the date of receipt at the project site.

PART 2 PRODUCTS

2.1 BULLET RESISTANT FIBERGLASS MATERIAL

The panels shall be made of multiple layers of starch-oil woven roving ballistic grade fiberglass cloth impregnated with a thermoset polyester resin and compressed into flat rigid sheets. The production technique and materials used shall provide the controlled internal delamination to permit the encapture of a penetrating projectile. Bullet Resistant Fiberglass panels shall be UL Listed **Armortex® OF 300** manufactured by Safeguard Security Services, Ltd., San Antonio, Texas. Phone: (210)-661-8306, (800)-880-8306, Fax: (210)-661-8308. Unlisted bullet resistant fiberglass products will not be considered acceptable or equal. To insure the lowest freight and installation expense, UL Listed Level 3 bullet resistant fiberglass not manufactured with starch – oil ballistic grade cloth will be in excess of 7/16" in thickness and or exceed 4 lbs. per square foot and is not acceptable.

2.2 SECURITY LEVEL
The Bullet Resistant Fiberglass must be **UL LISTED RATED FOR LEVEL 3**

2.3 SUBSTITUTIONS
Other UL Listed bullet resistant fiberglass products are acceptable if in compliance with all requirements of this specification. Alternate products must be submitted to the architect for approval two weeks prior to bidding.

PART 3 EXECUTION

3.1 SUPPORTING MEMBERS
Prior to installing the bullet resistive material the contractor shall verify that all supports have been installed as required by the contract documents and the architectural drawings.

3.2 JOINTS
All joints shall be reinforced by a back-up layer of bullet resistive material. The bullet resistance of the joint, as reinforced, shall be at least equal to that of the panel. Minimum width of reinforcing layer at joint shall be 4". (2" on each panel or a 2" minimum overlap)

3.3 APPLICATION
Armor shall be installed in accordance with the manufacturer's printed recommendations. Armor panels shall be adhered using an industrial adhesive, mastic, screws or bolts. Method of application shall maintain the bullet resistive rating at junctures with the concrete floor slab, the concrete roof slab, the bullet resistive door frames, the bullet resistive window frames, and all required penetrations.

End of Section

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes acoustical panel.

1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Samples: For each acoustical panel, and for each color and texture required.

C. Product test reports.

D. Maintenance data.

1.3 QUALITY ASSURANCE

A. Acoustical Testing Agency Qualifications: An independent testing laboratory or an NVLAP-accredited laboratory.

B. Fire-Test-Response Characteristics:

1. Fire-Resistance Ratings: Where indicated, provide acoustical panel ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Ratings are indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.

a. Identify materials with appropriate markings of applicable testing and inspecting agency.

2. Surface-Burning Characteristics: Acoustical panels complying with ASTM E 1264 for Class **A** materials, when tested per ASTM E 84.

a. Smoke-Developed Index: 450 or less.

1.4 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Units: Full-size units equal to **2.0** percent of quantity installed, but not fewer than.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.
2. Products: Subject to compliance with requirements, provide products specified.

2.2 GENERAL

A. Acoustical Panel Standard: Comply with ASTM E 1264.

2.3 ACOUSTICAL PANELS ACT-1

A. Products:

1. Armstrong "Optima"

2. Approved Equal.

B. Color: **White**

C. Edge Detail: **Square**

D. Thickness: **3/4 inch**

E. Size: **24 by 24 inches**

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install acoustical panel ceilings to comply with **ASTM C 636** and seismic requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Vinyl composition floor tile (VCT).
2. Resilient wall base and accessories.

1.3 SUBMITTALS

A. Product Data: For each type of product specified.

B. Samples for Initial Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors and patterns available for each type of product indicated.

C. Samples for Verification: Full-size tiles of each different color and pattern of resilient floor tile specified, showing the full range of variations expected in these characteristics.

1. For resilient accessories, manufacturer's standard-size samples, but not less than 12 inches (300 mm) long, of each resilient accessory color and pattern specified.

D. Product Certificates: Signed by manufacturers of resilient products certifying that each product furnished complies with requirements.

E. Maintenance Data: For resilient floor tile to include in the maintenance manuals specified in Division 1.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing resilient products similar to those required for this Project and with a record of successful in-service performance.

B. Source Limitations: Obtain each type, color, and pattern of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

C. Fire-Test-Response Characteristics: Provide products with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Critical Radiant Flux: 0.45 W/sq. cm or greater when tested per ASTM E 648.
2. Smoke Density: Maximum specific optical density of 450 or less when tested per ASTM E 662.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.

B. Store products in dry spaces protected from the weather, with ambient temperatures maintained between 50 and 90 deg F (10 and 32 deg C).

C. Store tiles on flat surfaces.

D. Move products into spaces where they will be installed at least 48 hours before installation, unless longer conditioning period is recommended in writing by manufacturer.

1.6 PROJECT CONDITIONS

A. Maintain a temperature of not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C) in spaces to receive products for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless manufacturer's written recommendations specify longer time periods. After postinstallation period, maintain a temperature of not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

B. Do not install products until they are at the same temperature as the space where they are to be installed.

C. Close spaces to traffic during flooring installation and for time period after installation recommended in writing by manufacturer.

D. Install tiles and accessories after other finishing operations, including painting, have been completed.

E. Where demountable partitions and other items are indicated for installation on top of resilient tile flooring, install tile before these items are installed.

F. Do not install flooring over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive, as determined by flooring manufacturer's recommended bond and moisture test.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, those indicated in the Resilient Tile Flooring Schedule at the end of Part 3.

2.2 RESILIENT TILE

A. Vinyl Composition Floor Tile: Products complying with ASTM F 1066 and with requirements specified in the Resilient Tile Flooring Schedule.

2.3 RESILIENT ACCESSORIES

A. Rubber Wall Base: Products complying with FS SS-W-40, Type I and with requirements specified in the Resilient Tile Flooring Schedule.

B. Vinyl Accessory Moldings: Products complying with requirements specified in the Resilient Tile Flooring Schedule.

2.4 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by flooring manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where installation of resilient products will occur, with Installer present, for compliance with manufacturer's requirements. Verify that substrates and conditions are satisfactory for resilient product installation and comply with requirements specified.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by flooring manufacturer.
2. Subfloor finishes comply with requirements specified in Division 3 Section "Cast-in-Place Concrete" for slabs receiving resilient flooring.
3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

C. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with resilient product manufacturer's written installation instructions for preparing substrates indicated to receive resilient products.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.

C. Remove coatings, including curing compounds, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

D. Broom and vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.3 TILE INSTALLATION

A. General: Comply with tile manufacturer's written installation instructions.

B. Lay out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half of a tile at perimeter.

1. Lay tiles square with room axis, unless otherwise indicated.

C. Match tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Cut tiles neatly around all fixtures. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles in pattern of colors and sizes indicated on Drawings.

D. Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures, including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.

E. Extend tiles into toe spaces, door reveals, closets, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other nonpermanent, nonstaining marking device.
1. Adhere tiles to flooring substrates using a full spread of adhesive applied to substrate to comply with tile manufacturer's written instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times.
2. Provide completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

G. Hand roll tiles according to tile manufacturer's written instructions.

3.4 RESILIENT ACCESSORY INSTALLATION

A. General: Install resilient accessories according to manufacturer's written installation instructions.

B. Apply resilient wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

1. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
2. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
3. Do not stretch base during installation.
4. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
5. Install premolded outside corners before installing straight pieces.
6. Install premolded outside and inside corners before installing straight pieces.

C. Place resilient accessories so they are butted to adjacent materials and bond to substrates with adhesive. Install reducer strips at edges of flooring that would otherwise be exposed.

D. Apply resilient products to stairs as indicated and according to manufacturer's written installation instructions.

3.5 CLEANING AND PROTECTING

A. Perform the following operations immediately after installing resilient products:

1. Remove adhesive and other surface blemishes using cleaner recommended by resilient product manufacturers.
2. Sweep or vacuum floor thoroughly.
3. Do not wash floor until after time period recommended by flooring manufacturer.
4. Damp-mop floor to remove marks and soil.

B. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by flooring manufacturer.

1. Apply protective floor polish to floor surfaces that are free from soil, visible adhesive, and surface blemishes, if recommended in writing by manufacturer.

a. Use commercially available product acceptable to flooring manufacturer.
b. Coordinate selection of floor polish with Owner's maintenance service.

2. Cover products installed on floor surfaces with undyed, untreated building paper until inspection for Substantial Completion.

3. Do not move heavy and sharp objects directly over floor surfaces. Place plywood or hardboard panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

C. Clean floor surfaces not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean products according to manufacturer's written recommendations.

1. Before cleaning, strip protective floor polish that was applied after completing installation only if required to restore polish finish and if recommended by flooring manufacturer.
2. After cleaning, reapply polish to floor surfaces to restore protective floor finish according to flooring manufacturer's written recommendations. Coordinate with Owner's maintenance program.

3.6 RESILIENT TILE FLOORING SCHEDULE

A. Vinyl Composition Tile: VCT-# Where this designation is indicated, provide vinyl composition floor tile complying with the following:

1. Color and Pattern: As specified by product designation on finish schedule.
2. Class: Class 2 through-pattern tile.
3. Wearing Surface: Smooth.
4. Thickness: 1/8 inch (3.2 mm).
5. Size: 12 by 12 inches (304.8 by 304.8 mm).

B. Rubber Wall Base VCB-# Where this designation is indicated, provide rubber wall base complying with the following:

1. Available Products: As follows:
   a. Johnsmite, RubberBase.
   b. Approved Equal.

2. Color and Pattern: As specified by product designation indicated on drawings.
3. Style: Cove with top-set toe.
4. Minimum Thickness: 1/8 inch (3.2 mm).
5. Height: 4 inches (101.6 mm).
6. Lengths: Coils in lengths standard with manufacturer, but not less than 96 feet (29.26 m).
7. Outside Corners: Premolded.
8. Inside Corners: Premolded.
9. Ends: Premolded.
10. Surface: Smooth.

C. Vinyl Accessory Moldings: Provide vinyl accessory molding complying with the following:

1. Available Products: As follows:
   a. Johnsmite.
   b. Approved Equal.

2. Color: As selected by Architect from manufacturer's full range of colors produced for vinyl accessory molding complying with requirements indicated.
3. Product Descriptions: Carpet edge for glue-down applications. Carpet nosing. Nosing for resilient floor covering. Reducer strip for resilient flooring. Transition cap between carpet and resilient flooring. Stair Nosing.
4. Profiles and Dimensions: As indicated.

END SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this section.

1.2 SUMMARY

A. This Section includes the following:

1. Woven Carpet with interlock backing.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance. Include installation recommendations for each type of substrate required.

B. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet: 12-inch- (300-mm-) square Sample.
2. Exposed Edge Stripping and Accessory: 12-inch- (300-mm-) long Samples.
3. Carpet Seam: 6-inch (150-mm) Sample.

C. Product Schedule: Use same room and product designations indicated on Drawings and in schedules.

D. Maintenance Data: For carpet to include in maintenance manuals specified in Division 1. Include the following:

1. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.

B. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E 648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

C. Product Options: Products and manufacturers named in Part 2 establish requirements for product quality in terms of appearance, construction, and performance. Other manu-

facturers' products comparable in quality to named products and complying with requirements may be considered. Refer to Division 1 Section "Substitutions."

1.5 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with CRI 104, Section 5, "Storage and Handling."

1.6 PROJECT CONDITIONS

A. General: Comply with CRI 104, Section 6.1, "Site Conditions; Temperature and Humidity."

B. Environmental Limitations: Do not install carpet until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

C. Do not install carpet over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet manufacturer.

1.7 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Carpet Warranty: Written warranty, signed by carpet manufacturer agreeing to replace carpet that does not comply with requirements or that fails within specified warranty period. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, and delamination.

1. Warranty Period: Lifetime limited Woven Interlock Warranty.
2. Lifetime Static

PART 2 - PRODUCTS

2.1 CARPET

A. Verify carpet color and pattern with Architect and Owner prior to ordering.

B. Provide and install the following product or approved equivalent:

1. Manufacturer: Shaw Contract Group,
2. Style Name: Constellation
3. Color: 26710 Shooting Star
4. TEKLOK Standard Backing
5. Width: 12'-0"

C. Performance Characteristics: As follows:

1. Flammability: Flooring radiant panel. Class 1 – Direct Glue Down
2. Smoke Chamber: Less than 450

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided by or recommended by the following:

1. Carpet manufacturer.

B. Seaming Cement: Hot-melt adhesive tape or similar product recommended by carpet manufacturer for taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.

C. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance. Verify that substrates and conditions are satisfactory for carpet installation and comply with requirements specified.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:

1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by the following:

a. Carpet manufacturer.

2. Subfloor finishes comply with requirements specified in Division 3 Section "Normal-Weight Structural Concrete" for slabs receiving carpet.
3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and carpet manufacturer's written installation instructions for preparing substrates indicated to receive carpet installation.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by the following:

1. Carpet manufacturer.

D. Broom and vacuum clean substrates to be covered immediately before installing carpet. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Direct-Adhered Installation: Comply with manufacturer's instructions and applicable provisions of CRI 104-1994.

B. Comply with carpet manufacturer's written recommendations for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.

C. Do not bridge building expansion joints with carpet.

D. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.

E. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

F. Install pattern parallel to walls and borders.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet:

1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
2. Remove yarns that protrude from carpet surface.
3. Vacuum carpet using commercial machine with face-beater element.

B. Protect installed carpet to comply with CRI 104, Section 15, "Protection of Indoor Installations."

C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet manufacturer.

END OF SECTION

PART 1 - GENERAL

1.1 Related Documents

A. Division 1 of the specifications, drawings, finish schedules, wall types and notes.

B. General: Paint shall be selected from manufacturer's best quality commercial grade, professional coatings paint line, that also meet the environmental standards listed below.

1. Water repellency/breathability.
2. Binder type (alkyd, latex, vinyl).
3. Adhesion.
4. Abuse resistance (scratch, dirt).
5. Mold & mildew resistance.
6. Hiding ability.
7. Sheen (cleanability, hardness, gloss retention)
8. Drying time.
9. VOC & odor.
10. Cost.
11. Ease of application.

C. References

1. Florida Building Code (FBC)
2. Painting and Decorating Contractors of America (PDCA) www.pdca.org

D. Industry Standards and Tests

1. The coatings industry does not have recognized, measurable technical criteria or performance standards for product evaluation, nor does it have data for realistic expectations.
2. ASTM D 16-00 Standard Terminology for Paint, Related Coatings, Materials and Applications.
3. ASTM D 523-89 (1999) Standard Test Method for Specular Gloss.
4. PDCA P4-94 *Responsibilities for Inspection and Acceptance of Surfaces Prior to Painting and Decorating* www.pdca.org/standards/standards.html

E. Environmental Standards: Approved products must meet VOC standards of Zero VOC coatings where specified, a maximum amount of VOC's of 150 g/L for all Interior coatings (except WB Epoxy at 245 g/L) and 200 g/L for all Exterior coatings. Exterior Texture Coating for concrete is excluded.

1.2 ENVIRONMENTAL CONSIDERATONS

A. The Clean Air Act is a lengthy and complex federal law containing many provisions to improve and protect air quality in the United States. It gives the US Environmental Protection Authority (EPA) the responsibility for setting national ambient air quality

standards to protect public health, while giving states the job of determining how best to meet those standards.

B. A VOC (volatile organic compound) is an aromatic carbon-containing compound, generally a petroleum distillate, which evaporates readily into the air. Many of the components of paints that help them perform as intended are VOC's and evaporate as the paint dries and cures.

C. VOC's mix in the atmosphere with nitrous oxides that are present from automobile exhaust and result in ground level ozone, a major component of smog and contributor to respiratory difficulties.

D. The Florida Department of Environmental Protection is the lead agency responsible for implementing the Clean Air Act in Florida. The department is assisted in this effort by county air pollution control agencies located in Orange County, amongst others.

E. Florida's Clean Air Act
Florida Department of Environmental Protection
www.dep.state.fl.us/air/programs/cleanair.htm

1.3 LOW ODOR PAINTS

A. The primary odor-causing agent in paint is solvent. However, during application, some odors are released by the substrate surface itself being wetted with water or solvent contained within the paint product.

B. By definition, low odor paint is as solvent-free as possible. Most sources characterize low odor as one that contains no more than 4 grams VOC per gallon or 1 gram per liter.

1.4 CAUTIONS

A. Care shall be exercised when selecting finishes for use over exterior materials.

B. Application of the wrong finish materials (non-breathable) on exterior walls will trap moisture in both walls and ceilings, causing moisture retention and lead to indoor air quality problems, amongst others.

1.5 QUALITY ASSURANCE

A. Preparation: See Surface Preparation paragraph 3.2 for proper substrate preparation prior to commencement of Work.

B. Contractor's (Applicator) Acceptance:

1. It is assumed that the professional Painting Sub-Contractor (Applicator) is best qualified to recognize problems with substrates that could lead to coating failure.
2. The Applicator shall certify acceptance of all substrates prior to the application of any material. The certification shall state that the substrate is acceptable and ready for the finish coating application to begin and that the substrates do not exceed the allowable recommended moisture content.
3. Applicators shall not proceed with the Work until the Work is acceptable and certified as such by the Applicator.

1.6 SUBMITTALS

A. Furnish Product Data Sheet of each item specified.

B. Submit samples of manufacturer's standard warranty for each product.

C. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.

2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

3. VOC content.

1.7 WARRANTY

A. Paint Manufacturer's Warranty: In addition to other warranties, the paint Manufacturer shall provide product warranties standard with the manufacturer of each product specified.

B. Texture Coating Manufacturer's Warranty: In addition to other warranties, the texture coating Manufacturer shall warrant the texture coating against cracking and fading for a minimum of five (5)years.

C. Unless otherwise stated, duration of all warranties shall begin on the date of Substantial Completion.

PART 2 - PRODUCT SYSTEMS

2.1 ACCEPTABLE MANUFACTURERS

A. Paints

1. Colorwheel Paints and Coatings
2. ICI Dulux Paint Centers
3. M. A. Bruder and Sons, Inc. (MAB Paints)
4. Sherwin-Williams Company

B. Exterior Textured Coatings

1. ICI Dulux Paint Centers
2. M. A. Bruder and Sons, Inc. (MAB Paints)
3. Sherwin-Williams Company

2.2 RECOMMENDED PRODUCTS

A. Products used for finish coatings shall be selected from a manufacturer's best quality commercial grade, professional coatings paint line for optimum protection and durability.

B. The following two tables (D and E) for interior and exterior painting systems are recommendations for new construction only and assume properly prepared substrates.

C. The products listed in the following two tables may also be used in re-coating existing facilities.

PART 3 - QUALITY ASSURANCE DURING EXECUTION

3.1 DESIGN INTENT

A. New Construction

1. Surfaces to receive initial painting shall receive a primer and two finish coats.
2. Due to certain tinted colors, low hiding colors or radical color changes, industry standards may require an additional finish coat(s).

B. Repainting Existing Construction

1. Surfaces previously painted with alkyd finish coats shall be primed with a tintable alkyd-based primer intended to bond latex or acrylic topcoats.
2. Surfaces previously painted with a latex or acrylic-based paint generally require no primer.
3. Typically, one finish coat is all that is required for coverage over correctly tinted primers.

C. Prudent life-cycle analysis dictates the use of a semi-gloss latex paint in high-use areas such as classrooms and corridors maintained in a scheduled repainting program.

D. Due to their hardness and cleanability, Water-Based Epoxy Gloss shall be used for new construction on both interior and exterior metal doors and frames. Acrylic Gloss with appropriate bonding-type primer shall be used when re-painting over alkyd enamels.

E. Semi-gloss acrylics shall be used on exterior due to their resistance to ultra-violet light (chalking, fading and yellowing).

F. Paint manufacturer's representative(s) shall review and approve all paint specifications and substrates prior to initial paint coating application.

3.2 SURFACE PREPARATION

A. Prior to starting Work, the Applicator shall certify acceptance of all substrates. See paragraph 1.7 F.

B. Carefully follow the paint manufacturer's recommendations for minimum surface acceptability and the recommendations of recognized trade associations.

C. In general, substrates shall be dry, clean and slightly rough. Surfaces to be painted shall be free of dirt, oil, release agents, grease, rust, mill scale, efflorescence, laitance and other surface imperfections and contaminants or any substance which may adversely affect the performance of the coating before the application process begins.

D. The paint manufacturer shall assist the Paint Contractor with prearranged site visits during surface preparation or product application phases of the job to assure the quality of the work meets all plans, specifications, or applicable standards. Site Visit Reports are required for all visits to the job by Manufacturer's representatives. Any deviations to the specifications must be included in the Site Visit Report and sent to the General Contractor and/or CM, Architect and owner. With the proper completion of the Site Visit Reports, the likelihood is increased that the manufacturers' products will be applied in a proper manner, consistent with and in accordance with label

and/or data sheet directions and the written specification which may have been established for the job by other than the paint manufacturer. These Site Visit Reports will be furnished free of charge as a courtesy of the paint manufacturer.

E. Inspections for pH will be required by paint manufacturer on all masonry and concrete surfaces and will be documented on approved inspection forms on the behalf of owner. Acceptable range shall be 8.0 pH to 9.0 pH. Surfaces will be inspected for proper pH levels prior to the application of any primers, sealers or paint coatings. Inspections for DFT and wet film thickness will also be required by paint manufacturer and will be documented on approved inspections forms on the behalf of owner. Copies will be given to owner and/or Project Manager.

F. Exterior caulks and/or sealants shall not be applied until primers and/or sealers have been properly applied.

G. Painting Contractor shall be responsible to see that all surface rust and mill scale is removed in accordance with the Steel Structures Painting Council. This process should be performed to a minimum of SSPC-SP-2, Hand Tool Cleaning or SSPC-SP-3, Power Tool Cleaning.

H. Sand new wood and metal surfaces to roughen surfaces prior to the application of primer. Glossy and semi-glossy surfaces shall receive similar attention prior to application of finish coat when repainting.

I. Concrete, masonry, stucco, EIFS, plaster and similar surfaces shall be permitted to cure properly for 28 days, minimum, prior to application, unless specifically stated on the product data sheet, no exceptions allowed. Surfaces shall be checked with an electronic moisture meter for maximum allowable moisture content prior to application.

J. Concrete, masonry, stucco, EIFS, plaster and similar surfaces shall be pressure cleaned with minimum 2500 psi, 8"-wide pattern water stream prior to the application of elastomeric systems. Surface shall then be water-bead tested to assure that contaminants have been removed. Note: Surfaces should be allowed to dry a minimum of 48 hours prior to priming or painting.

K. Shellac-based knot sealers shall be used over knots and resinous areas in wood prior to the application of primer.

L. Apply elastomeric patching compound to cracked stucco and concrete surfaces prior to applying elastomeric coating. Application of sealants or exterior caulking to cracked stucco and concrete surfaces is unacceptable.

3.3 COMPATIBILITY

A. Materials shall be applied as one unified system, i.e. surface preparation, primer, second coat and third coat; all compatible products, each dependant upon the other, and as recommended by the coating manufacturer for a particular finish on a particular surface. Likewise, coating materials and equipment shall be compatible in use; finish coats shall be compatible with prime coats; prime coats shall be compatible with the surface to be coated; tools and equipment and the method of application shall be compatible with the coating to be applied.

B. Thinners, if any, shall be only those recommended for that purpose by the manufacturer of the material to be thinned.

C. Coating materials selected for systems for each type of surface shall be the product of a single manufacturer.

3.4 APPLICATION

A. Environmental Conditions: Adhere to strict conformance of paint manufacturer's written instructions with regard to temperature, humidity and moisture content requirements.

B. Do not apply finishes over UL door and frame labels.

C. Ensure that exterior caulks and/or sealants have not been applied until primers and/or sealers have been properly applied as per Par. 3.2.F.

D. Concrete, cement plaster (stucco), EIFS and CMU shall be allowed to cure for a minimum of 28 days prior to the application of any primers, finishes or coatings (including elastomerics). Concrete includes cast-in-place, pre-cast, tilt-wall, composite insulating panels and the like. Ensure that inspections for "Wet Film Thickness" (WFT) and "Dry Film Thickness" (DFT) are completed and approved as per Par. 3.2.E.

E. Topcoats shall not be applied over inadequately cured primers.

F. Apply each coat in the dry film thickness as recommended by the coating manufacturer. Coating thickness is based on the recommended WFT and DFT as listed on product data sheet. Ensure that inspections for pH are completed and approved on all masonry and concrete surfaces prior to application of any primers, sealers or painting coatings as per Par. 3.2.E

3.5 PROPER SEQUENCE AND SCHEDULING

A. Slightly vary the color of succeeding coats.

B. Allow sufficient time between successive coats for proper drying, in accordance to the manufacturer's written instructions.

C. The number of coats and film thickness required are the same regardless of application method. Coatings shall be solid, continuous and producing pinhole-free surfaces.

D. Omit primer over metal surfaces that have been shop primed and touchup painted.

E. If undercoats, stains or other conditions show through final coat of paint, at no additional cost to owner, apply additional coats until paint film is of uniform finish, color and appearance. Give special attention to ensure that edges, corners, crevices welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

3.6 PROTECTION DURING CONSTRUCTION

A. Protect work of other trades against damage from painting, whether being painted or not.

B. Provide "Wet Paint" signs to protect newly painted finishes.

3.7 EXTERIOR PAINT SCHEDULE

A. Concrete and Stucco: Provide the following finish systems over exterior concrete, stucco, and brick masonry surfaces:

1. Satin Acrylic Finish: 1 finish coats over a primer.

a. First Coat: COMEX/ColorWheel, Quick Care Conditioner #1252 or approved equivalent.

b. Second 2-Coats: COMEX/ColorWheel, Flex Lox 1240/1270 or approved equivalent applied 10.0 mils DFT.

3.8 INTERIOR PAINT SCHEDULE

A. Gypsum Board: Provide the following finish systems over interior gypsum board surfaces:

1. Low-Luster, Acrylic-Enamel Finish: 2 finish coats over a primer.

a. Primer: Latex-based, interior primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.

b. First and Second Coats: Low-luster (eggshell), acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.8 mils.

2. Semigloss, Acrylic-Enamel Finish: 2 finish coats over a primer.

a. Primer: Latex-based, interior primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.

b. First and Second Coats: Semigloss, acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.6 mils.

B. Ferrous Metal: Provide the following finish systems over ferrous metal:

1. Eggshell, Acrylic-Enamel Finish: Two finish coats over a primer.

a. Primer: Quick-drying, rust-inhibitive, alkyd-based or epoxy-metal primer, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.5 mils.

b. Finish Coat: Eggshell, acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Shower Room Accessories.

1.3 SUBMITTALS

A. Product Data: Include construction details, material descriptions and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory specified.

B. Samples: For each accessory item to verify design, operation, and finish requirements.

1. Approved full-size Samples will be returned and may be used in the Work.

C. Setting Drawings: For cutouts required in other work; include templates, substrate preparation instructions, and directions for preparing cutouts and installing anchoring devices.

D. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required. Use designations indicated in the Toilet and Bath Accessory Schedule and room designations indicated on Drawings in product schedule.

E. Maintenance Data: For accessories to include in maintenance manuals specified in Division 1. Provide lists of replacement parts and service recommendations.

1.4 QUALITY ASSURANCE

A. Source Limitations: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise approved by Architect.

B. Product Options: Accessory requirements, including those for materials, finishes, dimensions, capacities, and performance, are established by specific products indicated in the Toilet and Bath Accessory Schedule.

1. Products of other manufacturers with equal characteristics, as judged solely by Architect, may be provided.
2. Other manufacturers' products with equal characteristics may be considered. See Division 1 Section "Substitutions."

1.5 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by disabled persons, proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.6 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Manufacturer's Mirror Warranty: Written warranty, executed by mirror manufacturer agreeing to replace mirrors that develop visible silver spoilage defects within minimum warranty period indicated.

1. Minimum Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering accessories that may be incorporated into the Work include, but are not limited to, the following:

1. Toilet and Bath Accessories:

a. A & J Washroom Accessories, Inc.
b. Bobrick Washroom Equipment, Inc.
c. Bradley Corporation.

B. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, those indicated in the Toilet and Bath Accessory Schedule at the end of the project manual.

2.2 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, with No. 4 finish (satin), in 0.0312-inch (0.8-mm) minimum nominal thickness, unless otherwise indicated.

B. Sheet Steel: ASTM A 366/A 366M, cold rolled, commercial quality, 0.0359-inch (0.9-mm) minimum nominal thickness; surface preparation and metal pretreatment as required for applied finish.

C. Galvanized Steel Sheet: ASTM A 653/A 653M, G60 (Z180).

D. Chromium Plating: ASTM B 456, Service Condition Number SC 2 (moderate service), nickel plus chromium electrodeposited on base metal.

E. Galvanized Steel Mounting Devices where indicated: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

F. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed and when concealed.

2.3 FABRICATION

A. General: One, maximum 1-1/2-inch- (38-mm-) diameter, unobtrusive stamped manufacturer logo, as approved by Architect, is permitted on exposed face of accessories. On interior surface not exposed to view or back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.

B. Surface-Mounted Toilet Accessories: Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless-steel hinge. Provide concealed anchorage where possible.

C. Recessed Toilet Accessories: Unless otherwise indicated, fabricate units of all-welded stainless steel construction, without mitered corners. Hang doors and access panels with full-length, stainless-steel hinge. Provide stainless steel anchorage that is fully concealed when unit is closed.

D. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Secure mirrors to walls in concealed, tamper-resistant manner with special hangers, toggle bolts, or screws. Set units level, plumb, and square at locations indicated, according to manufacturer's written instructions for substrate indicated.

C. Install grab bars to withstand a downward load of at least 250 lbf (1112 N), when tested according to method in ASTM F 446.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

3.3 TOILET AND BATH ACCESSORY SCHEDULE

A. Grab Bar (Not Used): Where indicated, provide stainless-steel grab bar complying with the following:

1. Stainless-Steel Nominal Thickness: Minimum 0.05 inch (1.3 mm).
2. Mounting: Concealed with manufacturer's standard flanges and anchors.
3. Gripping Surfaces: Smooth, satin finish.
4. Outside Diameter: 1-1/2 inches (38 mm) for heavy-duty applications.

B. Toilet Paper Dispenser (Not Used): Where indicated, provide toilet tissue dispenser complying with the following:

1. Type: Side-by side double roll, locking spimdles, sizes for standard core tissue.
2. Mounting: Surface mounted.
3. Material: Smooth satin Stainless steel.
4. Operation: Noncontrol delivery with mfr's standard spindle.

C. Paper Towel Dispenser (Not Used): Where this designation is indicated, provide smooth satin finished stainless-steel paper towel dispenser complying with the following:

1. Recess-Mounted Type (where indicated): Sized for minimum of 350 C-fold or 475 multifold paper towels without using special adapters; with hinged front equipped with tumbler lockset; and with refill indicators that are pierced slots at sides or front.

D. Soap Dispenser: Where indicated, provide soap dispenser complying with the following:

1. Liquid Soap Dispenser (Not Used): Drawn body, one piece seamless construction. Back plate with mounting bracket attached. Furnished with concealed wall plate. Equipped with unbreakable clear acrylic soap refill indicator window and a locked hinged stainless steel lid for top filling.

   a. Mounting: Surface of Wall.
   b. Soap Valve: Corrosion resistant black molded plastic, push putton valve that requires one hand operation without tight grasping, twisting or pinching, and wth less than 5 lbs of force to comply with barrier free guidelines.
   c. Container sized for a minimum soap capacity of 40-oz.
   d. Finish: Stainless Steel, smooth satin finish.

E. Towel Pin (where indicated): Surface mount smooth satin stainless steel finish with concealed stainless steel mounting bracket.

F. Framed Glass-Mirror Units (Not Used):

1. Fabricate frames for glass-mirror from type 430 bright polished stainless steel to accommodate glass edge protection material that is ½"x1/2"x3/8" channel ¼" return at rear. Frame is to be one piece with 90 degree mitered corners. Provide mirror backing and support system that permits rigid, tamper-resistant glass installation and prevents moisture accumulation.

2. Provide galvanized steel backing sheet, not less than 0.034 inch (0.85 mm) and full mirror size, with nonabsorptive filler material. Corrugated cardboard is not an acceptable filler material.

3. Shelf (where indicated): Bright Polished Stainless steel 22 gauge, 3/8" returned edges on front and sides with front edge hemmed for additional safety. Shelf is welded to mirror frame and reinforced by concealed 16 gauge stainless steel brackets. No exposed conncetors or fasteners.

4. Mirror-Unit Hangers: Provide mirror-unit mounting system that permits rigid, tamper- and theft-resistant installation, as follows:

5. Heavy-duty wall brackets of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.

G. Sanitary Napkin/Tampon Vender and Disposal Units (Not Used): Recess Mounted.
   1. Coin Operated Vendor: Single coin operation for 25 cents. Each coin operation is equipped with tumbler lock and key.
   2. Sanitary Disposal Unit Operation: Equipped with self closing panel covering disposal opening.

H. Convetable Paper Towel Dispenser and Waste Receptacle (Not Used): Recess mounted.

   1. Paper towel Dispenser: Smooth satin Stainelss Steel finish. Rounded towel tray with hemmed opening to dispense paper towels without tearing. Capacity: 600 C-fold or 800 multifold paper towels.

   2. Waste Receptacle: Smooth Satin stainless steel finish. Front and sides of bottom and all top edges hemmed for safe handling. Secured to cabinet with tumbler lock keyed sanitary napkin/tampon vendor.

   3. Equipped with interior hooks for optional vinyl liner.

   4. 12 gal capacity.

I. Shower Curtain Accessories:
   1. Hooks: Stainless steel for 1" or 1-1/2" diameter shower curtain rod.
   2. Vinyl Shower Curtain: 42" wide by 72" high. Opaque, Matte white vinyl 0.008" thick containing antibacterial and flame retardant agents. Nickel plated brass grommets along top, one every 6". Bottom and sides hemmed.
   3. Shower Curtain Rod: Santin finish Stainelss steel tubing. 1" outside diameter by 36" long. Flanges: 1-3/8" diameter satin polished stainless steel.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this and the other sections of Division 15.

1.02 SCOPE OF WORK

A. The work of this Section consists of all labor, materials, equipment, transportation, and facilities necessary to provide a complete and satisfactory system ready to use. Whenever the words "the Contractor" appear in this Division, they refer to the Contractor for work specified in that section. The Contractor shall examine ALL Drawings and ALL sections of the Specifications and shall be responsible for ascertaining to what extent other drawings and sections affect the work herein specified.

1.03 DESCRIPTION OF WORK

A. Heating, Ventilating and Air Conditioning Work is specified in the applicable portions of the following Sections:

15010	General Mechanical Provisions
15050	Basic Mechanical Materials and Methods
15060	Pipe and Pipe Fittings
15100	Valves
15250	Mechanical Insulation
15861	Fans and Ventilators
15890	Ductwork and Ductwork Accessories
15894	Ductwork Cleaning
15932	Air Devices
15991	Mechanical Systems Testing, Adjusting & Balancing

B. Plumbing Work is specified in the applicable portions of the following Sections:

15010	General Mechanical Provisions
15050	Basic Mechanical Materials and Methods
15400	Plumbing
15450	Plumbing Equipment

C. Definitions: The following terms shall have the meanings herein designated for each:

"Will": as used herein, is defined as an action by the Architect/Engineer, or by others.
"Shall": as used herein, is defined as an action required by the Contractor.
"May": as used herein, is defined as an action that is optional for the Contractor.

"Piping": as used herein, is defined as pipe, fittings, valves, flanges, unions, specialties and accessories and appurtenances necessary for, or incidental to, a complete system.
"Ductwork": as used herein, is defined as all air delivery, re-circulation and exhaust ducts whether of sheet metal or other material, and includes all connections, accessories and appurtenances necessary for and incidental to a complete system.
"Provide": as used herein, is defined as to furnish and install.
"Concealed work": as used herein refers to piping and ductwork above ceilings and within walls, partitions, shafts or service spaces, not normally exposed to view and enclosed on all sides by finish materials. Access to piping and ductwork would be by demolition of finish materials.
"Concealed but accessible work": as used herein refers to piping and ductwork accessible above or through suspended ceilings, in walls at access panels or in chases with access door or mandoors.
"Exposed work": refers to piping or equipment normally exposed to view within rooms or open areas.

1.04 QUALITY ASSURANCE

A. CODES AND STANDARDS: All work must be performed in accordance with the requirements of all pertinent Federal and State codes; but if in contradiction to the plans or the specifications, the proposed changes must first be referred to the Architect/Engineer for review and approval. Base bid shall include the more stringent of the contradicting methods.

All work shall comply with the latest edition of the following codes:

Florida Building Code – Building
Florida Building Code – Mechanical
Florida Building Code – Plumbing
Florida Building Code – Fuel / Gas

All equipment, apparatus and systems shall be rated, tested, fabricated and/or installed with the applicable industry standard mentioned. The following list will serve to clarify abbreviations that may appear in other Sections of the specification:

AGA	American Gas Association
ANSI	American National Standards Institute
ASTM	American Society for Testing Materials
AWWA	American Water Work Association
NFPA	National Fire Protection Association
UL	Underwriter's Laboratories, Incorporated
ASME	American Society of Mechanical Engineers
OSHA	Occupational Safety Hazards Act
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
NEMA	National Electrical Manufacturers' Association
NEC	National Electrical Code, current edition
AMCA	Air Movement and Control Association
ARI	Air Conditioning and Refrigeration Institute

B. PERMITS AND FEES: The Contractor and/or subcontractors shall be required to obtain building permits for the project.

Where inspections of the work are required by local authorities, the Contractor shall obtain certificates of inspections of his work by such authorities, and these certificates (in triplicate) shall be submitted to the Architect/Engineer before final certificate for payment under his contract will be issued.

1.05 SUBMITTALS

A. After receiving approval of material and equipment manufacturers, and prior to delivery of any material or equipment to job site, and sufficiently in advance to allow Architect/Engineer ample time for checking, submit for approval four (6) copies each of detailed, dimensioned product submittals and drawings or cuts showing construction, size, arrangement, operating clearances, performance characteristics, and capacity of material and equipment.

Contractor shall allow a minimum of seven (7) days for review of each submittal by the Engineer.

The Architect/Engineer's approval of such submittals shall not relieve this Contractor from responsibility for errors. Alterations to construction made necessary by reason of approval action on materials or equipment shall be the responsibility of the Contractor and shall be made without additional cost to the Owner.

B. Provide the required submittals noted under each section of these specifications.

C. Submittals shall be bound in a quality three-ring binder, indexed by specification section. Provide labeled dividers for each section. Each item submitted shall have as its cover sheet a completed Submittal Identification Sheet. A sample of this identification sheet is included at the end of this section.

All required items are to be submitted for review at one time. If for any reason an item cannot be submitted, the item shall be listed in the index and a section divider provided for inclusion when the item is submitted.

If submittals are received by the Engineer without the above requirements they will be returned unreviewed to the Contractor for compliance. Any delays in construction caused by this noncompliance shall be the Contractor's responsibility.

1.06 MAINTENANCE MANUAL AND OPERATING INSTRUCTIONS

A. At Substantial Completion, the Contractor shall provide the Owner with three (3) copies of a hardbound operating manual for all equipment furnished and installed under his work.

B. The manual shall include a manufacturer's maintenance and operating instructions and parts list and serial numbers for all operating equipment. One set of special tools necessary for any adjustment shall be delivered to the Owner.

C. Upon completion of the work, the Contractor shall put the systems into service. The Contractor shall be entirely responsible for the equipment during all testing operations. Each Contractor shall provide the Owner with one (1) 4-hour instruction sessions in the operation of the equipment and systems.

1.07 COORDINATION OF WORK, AND COORDINATION / SHOP DRAWINGS

A. Each Contractor and subcontractor shall be responsible for coordinating the installation of his equipment and work with the work of other trades.

B. The layout shown on the Drawings is necessarily diagrammatic but shall be followed as closely as actual construction and as other work will permit. Changes from these Drawings required to make the work conform to the building construction or other work of other trades shall be made by the Contractor without additional cost to the Owner, but only with the prior approval of the Architect/Engineer. All major changes shall be shown on the shop drawings to be submitted before changes are made.

C. The Contract Documents are design drawings, not fabrication and installation drawings. They are diagrammatic in nature and therefore do not indicate all offsets and fittings that may be necessary to complete the mechanical systems. The bidder is to assume, and include in his bid, all necessary transitions, offsets and fittings to complete the mechanical systems and shall indicate same in shop drawings.

D. Each Contractor shall communicate and coordinate with all other subcontractors and the General Contractor. Prior to fabrication and installation, prepare coordination drawings. Minimum scale shall be 1/4" = 1'-0", or larger. Detail major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Show space requirements for installation and access. Show where sequence and coordination of installations are important to the efficient flow of the Work. As a minimum, include the following information:

1. Planned piping layout, including valve and specialty locations and valve stem movement.
2. Planned duct systems layout, including elbow radii and duct accessories.
3. Placement of all equipment provided under Division 15.
4. Operating and maintenance clearances required by equipment manufacturers, including space for equipment disassembly required for periodic maintenance.
5. Clearances and access required by codes.
6. Clearances for installing and maintaining insulation.
7. Equipment service connections and support details.
8. Exterior wall and foundation penetrations.
9. Fire-rated wall and floor penetrations.
10. Sizes and location of required concrete pads and bases.

11. Scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
12. Floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
13. Reflected ceiling plans to coordinate and integrate installations, air outlets and inlets, light fixtures, communication systems components, sprinklers, and other ceiling-mounted items.

E. Layout shall be on shop drawings reflecting coordinated and integrated systems. Each shop drawing shall have a completed Contractor/ Subcontractor coordination log. These shop drawings shall be submitted to the Architect/Engineer for review. Owner and Engineer will retain one (1) set each. Provide minimum of four (6) sets.

F. See also Specification Section 15890, paragraph 3.01, for additional requirements related to fabrication, installation and shop drawings.

G. Contractor shall allow a minimum of seven (7) days for review of each shop drawing submittal by the Engineer.

H. Any equipment, fixtures and/or material installed without the proper coordination shall be removed and reinstalled at the expense of that Contractor.

I. The Mechanical Contractor shall coordinate with the Test and Balance Contractor and shall provide the Mechanical Contractor responsibilities noted in the Testing, Adjusting and Balancing Specifications.

1.08 JOB CONDITIONS

A. Protection

1. Protection of Work

a. The Contractor shall protect his work from injury. Keep all pipes and lines capped or plugged, drained, or otherwise protected from injury, including damage done by flooding or stoppage from building materials or dirt.
b. The Contractor shall protect equipment and fixtures furnished under his contract from damage during the construction of the building and he shall provide all tarpaulins, drop cloths, barricades, temporary heaters, auxiliary pumping equipment or other precautions as may be required.
Any material or equipment that is injured or damaged shall be removed immediately and replaced with new materials or equipment.

2. Damage to Building

a. Any damage to the building or its contents incurred by the installation and/or testing of the systems installed under these contracts shall be repaired promptly.

3. Overloading of Building

a. Care shall be taken that floors and/or roof are not overloaded during building operations, and the Contractor shall promptly remove all materials, which may overload any part of the building.

4. Removal of Rubbish

a. The Contractor shall at all times keep the premises free of all waste or surplus materials, rubbish and debris, which is caused by his employees or resulting from his work.
b. The Contractor shall provide drop cloths, or any other material necessary to protect floors, walls, furniture, equipment, etc., from soil or damage.
c. In case of dispute, the Owner may remove the rubbish, excess materials, or do all cleaning required and charge the cost to the Contractor.

1.09 WARRANTY

A. The warranty for all mechanical equipment (whether manufacturer's or contractor's warranty) shall comply with the requirements noted in the General Conditions and within each specification section (or a minimum of 12 months parts and labor, whichever is greater). This equipment shall include all equipment provided under Division 15.

1.10 PAY REQUEST APPROVAL

A. The Contractor shall provide to the Architect/Engineer a schedule of contract costs for the mechanical work on the project. This schedule of values shall be broken down by specification section with labor and material values shown separately.

B. The Contractor shall keep a field set of As-Built Drawings at the project site for review by the Architect/Engineer. These As-Builts shall be kept up to date at all times.

C. Architect/Engineer's approval of the mechanical portion of the pay request will be withheld if the above items have not been completed at the time of pay request review.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials and equipment shall be new, unless otherwise specified, and the best of their respective kinds.

2.02 SUBSTITUTIONS

A. Certain materials and equipment are specified by manufacturers or trade name and catalog or model number to establish standards of quality and performance, not for the purpose of limiting competition.

B. Where an item of material or equipment is specified to be a certain manufacturer's make with other manufacturer's names specifically mentioned, the Base Bid proposal shall include comparable material or equipment from one of those so specified.

C. Should the Contractor desire to receive consideration of equipment or materials other than as specified, he shall make such proposals in writing at the time of bidding, submitting therewith a statement of the extra or credit involved, if any, in the event the proposed substitution is accepted.

D. It shall be the Contractor's responsibility to present sufficient data, including samples if requested, to show why he considers the proposed substitution to be equal in quality and type to that specified.

E. It shall be each Contractor's responsibility to ascertain that alternate manufacturer's products meet detailed specifications and that size and arrangement of equipment is suitable for installation.

F. It shall be the responsibility of each Contractor making a substitution to include any changes required by the other trades for a proper operation of the equipment substituted.

G. All proposed substitutions will be reviewed by the Owner. Any substitutions which are accepted will be handled by a properly written Change Order after award of Contract and unless so set forth no proposed substitutions will be considered to have been accepted.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. The Contractor shall keep informed as to the Work of the trades engaged in the construction project, and other work being done in connection with the building, and shall execute his work in such a manner as not to interfere with or delay other Contractors.

B. The Contractor shall employ a competent foreman on the job throughout the entire period of construction to see that his work will not conflict with other work or trades, and that it is properly performed.

C. The foreman shall have a thorough knowledge of the work to be installed under this Contract and be a skilled mechanic experienced with projects of equal size and type.

D. Workmanship throughout shall correspond to the standard of best practice, and all labor employed must be competent and do the work required. Tool marks will not be permitted on any exposed materials, fittings or piping.

E. The Drawings accompanying these Specifications are design drawings and generally are diagrammatic. They do not show every offset, bend or elbow which may be required in the contract work for installation in the space allotted. The Contractor shall follow the Drawings as closely as practical and he shall install additional bends and offsets based upon measurements taken at the building, as may be required for installation of the work. Changes from these Drawings required to make this work conform to the Building construction work of other trades shall be made by this Contractor without additional cost to the Owner, but only with the prior approval of the Architect/Engineer. All major changes shall be shown on Shop Drawings to be submitted before the changes are made.

F. The Contractor will be expected to furnish materials and equipment promptly after award of contract, and shall proceed with his work without delay, and shall agree to perform and complete all of his work in progress with the work of other Contractors engaged on the project.

3.02 VISITING SITE

A. The Contractors shall visit the site and carefully examine the premises and thoroughly familiarize themselves as to the nature and scope of work and the difficulties that attend its execution.

B. The submission of a Proposal will be construed as evidence that such an examination has been made and later claims for labor, equipment or material required, or of difficulties encountered will not be recognized.

3.03 MEASUREMENTS

A. Contractors shall take their own measurements at the beginning and shall be responsible for the correctness of and proper fitting of their work.

B. Adjust all work to fit actual job conditions. Report to the Architect/ Engineer all measurement discrepancies, so that field corrections can be made before fabrication of project components.

END 15010

FORM TO FOLLOW

SUBMITTAL IDENTIFICATION SHEET

PROJECT
:

CONTRACTOR
:

SUBCONTRACTOR
:

SPECIFICATION REFERENCE:

ITEM:

NO. OF PAGES OF SUBMITTAL:

MODEL NO:

MANUFACTURER:

IS ITEM AS SPECIFIED:

REQUEST OF SUBSTITUTION:

OPTIONS/ACCESSORIES INCLUDED:

DEVIATIONS FROM SPECIFICATIONS:

ADDITIONAL REMARKS:

ENGINEER'S COMMENTS:

CONTRACTOR'S REVIEW STAMP

HANSON PROFESSIONAL SERVICES INC. (HANSON)
SHOP DRAWING, PRODUCT DATA OR SAMPLE REVIEW

☐ No Exceptions Taken ☐ Revise and Resubmit
☐ Furnish as Corrected ☐ Rejected – See Remarks

Hanson's review of submittals is solely for their general conformance with Hanson's design intent and general conformance with information given in the construction documents. Hanson's markings or comments shall not be construed as relieving the Contractor from compliance with the project plans and specifications, nor departure therefrom. Hanson shall not be responsible for any aspects of a submittal

that affect or are affected by means, methods, techniques, sequences and operations of construction, or safety precautions and programs incidental thereto, all of which are the Contractor's responsibility. The Contractor shall be responsible for lengths, weights, dimensions, elevations, quantities, etc., and coordination of the work with other trades. The Contractor shall be responsible to review all submittals and approve them in these respects.

By: Date:

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. This Section includes basic mechanical materials and methods to complement other Division 15 Sections.

1. Motors and Drives
2. Motor Starters
3. Pipe Identification Markers
4. Equipment Marker
5. Roof Curbs and Equipment Supports
6. Access Doors for Walls and Ceilings
7. Concrete Equipment Bases and Pads

1.02 QUALITY ASSURANCE

A. Furnish proof of the competency of each welding operator, for both field and shops welds, and have all welding operators pass a standard qualification test such as A.S.M.E., A.W.S. or Hartford Insurance Company procedure and tests.

1.03 SUBMITTALS

A. Submit in accordance with 15010.

B. Product Data:

1. All Items Specified Herein.

C. Shop Drawings:

1. Detail fabrication and installation for metal and wood supports and anchorage for mechanical materials and equipment.

D. Coordination Drawings:

1. Indicate access panel and door locations for all equipment and devices which require access.

E. Welding Certifications.

F. Schedules:

1. Valve tag schedule.

PART 2 - PRODUCTS

2.01 MOTORS AND DRIVES

A. Motors shall be standard NEMA design, of size and characteristics indicated on the Drawings and as follows:

1. Arranged to operate continuously under full load in an ambient temperature of 40 degrees Centigrade.
2. Motor service factor not less than 1.15, determined by the specific application.
3. Drip-proof unless specific application requires a hermetic, totally enclosed or explosion proof motor as noted.
4. Provided with either internal or external thermal overload protection. Motors to be used with variable frequency controllers shall have internal thermal overload protection.
5. Permanently lubricated or grease reservoir type bearings. Reservoir type bearings shall have top and bottom screw plugs for flushing and repacking.
6. For convenient access (particularly to clear belt guards) the lubrication fittings shall be extended with pipe and fittings properly secured in place.
7. Windings shall be copper.
8. The following Table indicates minimum efficiencies and power factors for three phase motors operating fully loaded at 1800 rpm with electrical characteristics of 200, 230, 460 volts, 60 hertz.

Horsepower	Efficiency	Power Factor
1	82.5	84
1-1/2	84.0	85.7
2	84.0	85.7
3	85.5	85.0
5	86.5	88.0
7-1/2	88.5	81.0
10	89.5	85.5
15	90.0	84.5
20	91.0	86.0
25	91.7	84.0
30	92.0	88.5
40	93.0	83.0
50	93.0	85.5
60	93.0	88.0
75	93.6	88.0
100	94.1	83.8
125	94.1	86.0
150	94.5	85.0
200	95.0	85.0

9. Approved Manufacturers and Models: Subject to compliance with the above specified requirements.

a. General Electric
b. Reliance
c. Siemens
d. Baldor
e. Lincoln
f. Gould
g. Louis-Allis
h. Peerless
i. Century

B. Drives shall have the following features:

1. Belted motors shall have sliding bases for adjustment of belt tension.
2. Equipped with sheaves of the vari-pitch type, except for equipment used with variable speed controllers. Drives and driven sheaves shall be machined cast steel.
3. Belt drives shall be of the V-belt type with drive capacity of at least 150 percent of motor horsepower. Belts shall be matched sets when multiple belt drives are used. No fan of integral HP or greater shall have less than two belts.
4. Belt drives, shafts and couplings shall be fully guarded with heavily reinforced expanded metal or woven wire in accordance with OSHA and National Safety Council Standards.
5. Provide openings in the guards opposite all shafts to permit the use of a tachometer.

2.02 MOTOR STARTERS

A. Starters shall be provided under Division 16 for all motors provided under Division 15 unless specified otherwise.

B. Starters required to be provided under Division 15 shall be as specified in Division 16, Section 16480.

2.03 PIPE IDENTIFICATION MARKERS

A. Provide printed identification markers to identify piping in accord with ASME A13.1 scheme for the identification of piping systems.

B. Identification markers shall be all-temperature vinyl printed cloth markers with adhesive back or acrylic plastic "snap around" style for application on insulated and bare piping.

C. Letters on markers for use on 3 inch and larger diameter pipe shall be 2 inch high and letters for markers for use on pipe less than 3 inch diameter shall be 1 inch high.

D. Apply markers after painting.

E. Approved Manufacturers and Models: Subject to compliance with the above specified requirements.

1. W.H. Brady Company - Z400 Indoor
2. Elcen - E-Z Mark
3. Seton Name Plate Corporation - Set Mark

2.04 EQUIPMENT MARKERS (Mechanically fastened)

A. Provide laminated plastic, color coded equipment markers. Conform to following color code:

1. Blue with white lettering: HVAC Equipment.
2. Red with white lettering: Plumbing Equipment.

B. Engrave with engraver's standard letter style, of sizes and with wording to match equipment identification. Minimum 1-1/2 inch high markers with 1 inch lettering.

2.05 ROOF CURBS AND EQUIPMENT SUPPORTS

A. Curbs and supports shall be constructed in accordance with the National Roofing Contractors Association Standards.

B. Roof curbs shall be galvanized steel, insulated, and prefabricated with straight sides suitable for the roof construction and pitch used.

C. The curbs shall have 1-1/2 inch or 2 inch insulation complete with solid galvanized steel retainer.

D. Curbs shall have a pressure treated wood top rail at least 1-1/2 inches square unless noted otherwise.

E. Support rails shall be galvanized steel, with full mitered and welded corners, integral base plate, and factory installed pressure treated wood nailer and galvanized steel counterflashing.

F. Provide 22 gage galvanized counterflashing where counterflashing is not provided with unit on curb.

G. Clear inside height shall be a minimum 14 inches or as noted on the drawings. Top of curb shall be a minimum of 10 inches above top of finished roof surface as installed. Contractor shall be responsible to select curb heights as required, taking into account thickness of roof construction materials and insulation.

H. Refer to details on the drawings for additional information.

I. Units to set dead level on curb. Refer to Architectural drawings for exact pitch of roof, or obtain actual conditions of existing construction.

J. Manufacturers:

1. Custom Curb
2. Thycurb
3. Pate

2.06 NON-SHRINK, NON-METALLIC GROUT

A. No Shrinkage, ASTM C-827.

B. Post-hardening, volume-adjusting, dry, hydraulic-cement grout, non-staining, non-corrosive, non-gaseous, and recommended for interior and exterior applications.

C. Contain no expansive cements or metallic fillings.

D. Design mix - 5000 PSI, 28-day compressive strength.

E. Pre-mixed and factory packaged.

F. Approved Manufacturers and Models: Subject to compliance with the above specified requirements.

1. Five Star Grout
2. Master Builders - Master Flow 713
3. W.R. Meadows - Field Tite 588 Non-Metallic

2.07 READY-MIX CONCRETE

A. Concrete shall be ready-mix concrete and shall conform to ASTM C 94, minimum compressive strength 3000 PSI at 28 days. Slump shall be between 3 and 5 inches, according to ASTM C 143.

B. Air-entraining admixtures shall conform to ASTM C 260.

C. Water-reducing admixtures, retarding admixtures, accelerating admixtures, water-reducing and accelerating admixtures, and water-reducing and retarding admixtures shall conform to ASTM C 494.

D. Fly ash or other pozzolans used as admixtures shall conform to ASTM C 618, Class F with 4 percent maximum loss on ignition and 20 percent maximum cement replacement by weight.

E. Reinforced with 6x6 - W2.1 x W2.1 WWF unless noted otherwise.

2.08 ACCESS DOORS

A. Frame, trim, and door material shall be steel. Frame shall be minimum 16 gauge. Door panel shall be minimum 14 gauge.

B. Hinges shall be concealed type which allow the door to open 175 degrees and shall have removable pins.

C. Lockable type with flush mounted steel cams.

D. Provide type appropriate for type of wall or ceiling to be installed.

E. Provide 1-1/2 hour "B" label door for use in rated walls and ceilings.

F. Doors shall be factory primed painted. Refer to painting specifications for additional requirements.

G. Provide all anchors necessary for installation.

H. Provide all doors from one single manufacturer. Submit for approval.

PART 3 - EXECUTION

3.01 ELECTRICAL WIRING

A. Contractor furnishing mechanical equipment shall provide all low voltage and line voltage control circuit wiring, conduit and connections and all wiring associated with starter holding coils, unless specifically designated as another contractor's work.

B. All wiring shall be in compliance with codes and Division 16 Specifications.

C. Electrical Contractor shall be responsible for all line voltage power wiring and final connections to complete the mechanical systems.

D. Electrical Contractor shall provide power circuit wiring and conduit to mechanical equipment components such as magnetic motor starters, manual motor starters, controller panels, disconnect switches, and motor starter heating elements.

E. Electrical Contractor shall provide all magnetic motor starters for Division 15 equipment unless specified otherwise.

F. The sharing of space within a common conduit by line voltage conductors and by control circuit conductors shall not be permitted.

G. In instances involving single phase motors or electrical devices controlled by another device, such as line voltage aquastat or other line voltage controller, the respective equipment supplying Contractor shall provide the wiring and conduit between the controller and controlled device. The respective equipment supplying contractor shall connect the switched legs to the power wiring in a junction box located at the controlled device. The Electrical Contractor will provide the junction box and the power wiring between the power source and the controlled device.

3.02 PIPE MARKER INSTALLATION

A. Provide pipe markers on all "exposed" and "concealed but accessible" insulated and bare pipe lines. See "Definitions", Section 15010.

B. Pipe markers shall be located as follows:

1. On straight runs of pipe at intervals not exceeding 50 feet, except on vacuum, air and gas pipes intervals not exceeding 20 feet.
2. At every sectionalizing or main shut off valve.
3. All piping exposed by access panels.

4. All piping mains in accessible chases.
5. On each riser at a point 5 feet above floor or platform.
6. At least once in every room the piping passes through for rooms less than 30 feet long in that direction.
7. For rooms longer than 30 feet, on both sides of a wall or partition through which pipe passes and at intervals not exceeding 50 feet.
8. Markers shall be applied so they can be read when standing on the floor.

3.03 CONCRETE EQUIPMENT PADS

A. Each Contractor shall supply concrete pads and machine bases required for his equipment unless specifically shown otherwise on the Drawings.

B. Concrete pads shall be supplied for the following equipment, unless otherwise indicated on the drawings.

1. A/C Condensing Units.

C. Pads shall be doweled into slab floors with one 1/2 inch steel dowel rod per 6 square feet of pad, but not less than 4 dowels. Dowel shall project a minimum 2 inches into the slab and 2 inches into the pad. Dowels shall be epoxied into existing slab with an approved system.

D. Pads shall be 4 inches high (6 inches for air handling units) unless shown otherwise. All edges shall be chamfered. Pads shall extend 6 inches beyond each side of equipment. Pads shall be continuously poured and neatly finished.

3.04 ROOF-CURB/EQUIPMENT SUPPORT INSTALLATION

A. Roof curbs shall be installed by General Contractor.

B. Miscellaneous steel framing shall be provided by the General Contractor. Flashing shall be provided by the Roofing Subcontractor.

C. Coordinate with Roofing Subcontractor to provide counterflashing or setting of unit if counter-flashing is integral with roof installation.

D. Mechanically fasten equipment to curb.

E. Equipment shall be dead level on curb.

3.05 EQUIPMENT MARKERS

A. All equipment provided under Division 15 shall be labeled.

B. Fasten with screws or rivets. Installation shall not break, crack, or deform label.

C. All controls and safety devices shall be clearly and permanently marked with embossed or printed plates as to purpose and as to operation. Plates shall be

laminated plastic (color selected by Architect/Engineer) with white or black letters, attached to the equipment or device with screws or rivets.

3.06 ACCESS DOORS

A. Comply with manufacturer's instructions for installing access doors.

B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finished surfaces. Install concealed-frame access doors flush with adjacent finish surfaces.

C. Adjust hardware and panels after installation for proper operation.

D. Remove and replace panels or frames that are warped, bowed, or otherwise damaged.

E. Door shall be properly prepped, primed and painted to match wall or ceiling.

F. Access doors for plumbing chase walls shall be mounted 16" above the finished floor, and shall be 2'-0" x 2'-0" unless otherwise noted.

3.07 PAINTING

A. Field painting of all mechanical equipment shall be done by the Contractor supplying the equipment.

B. Where factory finishes are provided on equipment, and no additional field painting is specified, all marred or damaged surfaces shall be touched-up or refinished by the Contractor furnishing the equipment, so as to leave a smooth, uniform finish at the time of final inspection. Where steel equipment has been scratched as to expose the metal, a prime coat of rust-inhibitive primer shall be applied prior to final touch-up or refinishing.

C. All structural steel or other ferrous metal furnished by any Contractor which is not galvanized, either inside or outside of the building shall be cleaned of all grease, oil, dirt, loose scale, etc. and given a prime coat of rust-inhibitive primer at the time of installation. All exposed structural steel or other ferrous metal outside of the building installed by a Contractor, not galvanized or specified to be painted under the Painting Section of the specifications shall be given two additional coats of long oil type paint with rust and corrosion-resistant qualities.

D. Equipment and structural steel, except where provided with a factory finish, shall be painted machine gray. Nameplates are to be left unpainted.

E. Exposed ductwork, soil, waste and storm water piping, conduit, etc. shall be painted to match the wall or ceiling.

END 15050

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Includes

1. Pipes and Fittings for Plumbing and HVAC
2. Pipe Supports
3. Ceiling, Wall and Floor Plates

B. Provide and install pipe and fittings as indicated including all offsets, fittings, sleeves, and accessories required for a complete and operable system.

1.02 QUALITY ASSURANCE

A. Furnish proof of the competency of each welding operator, for both field and shop welds, and has all welding operators pass a standard qualification test such as A.S.M.E., A.W.S. or Hartford Insurance Company procedure and tests.

1.03 SUBMITTALS

A. Submit in accordance with 15010.

B. Product Data:

1. All Items Specified Herein.

C. Certificates:

1. Welding Certificates.

PART 2 - PRODUCTS

2.01 PIPE AND FITTINGS

A. The type and class of pipe, fittings, coating, lining and joints to be used for each function and location is specified in pipe schedules or references in other Sections or on Drawings.

B. Copper Tubing:

1. ASTM B-88

2. Type L - Hard drawn.

3. Type K - Hard drawn or soft rolled.

4. Fittings:

a. Copper, ANSI B16.22.
b. Brass or Bronze, ANSI B16.18 for domestic use only.

5. Joints:

a. Soldered.
b. No lead bearing solder shall be permitted in potable water systems.

C. Hubbed Cast Iron Soil Pipe and Fittings

1. ASTM A-74, Service Weight (SV)

2. Bituminous coated, inside and outside.

3. Joints

a. Compression Gasket, ASTM C-564

4. Ends

a. Single hub with bead and spigot.
b. Double hub with bead.

D. Hubless Cast Iron Soil Pipe and Fittings

1. CISPI 301, Service Weight (SV)
2. Fittings: CISPI 301
3. Joints: Neoprene Gasket Clamp and Shield, CISPI 310
4. Ends: Hubless

E. PVC Pressure Pipe (for condensate lines only)

1. ASTM D-1784, Type I, Grade I PVC.

2. Schedule 40, unless noted otherwise.

3. All potable water pipe fittings and cement shall bear the NSF-14 seal of approval for that use.

4. Fittings: ASTM D-2466, Class 160 SDR-26.

5. Joints:

a. All sizes above grade, 3 inches and smaller below grade: Sleeve type couplings and socket joints (ASTM D-2466) with solvent (ASTM D-2565) welds.
b. Larger than 3 inches below grade: Bell-to-plain ends with lubricated rubber ring push-on joints, ASTM D-2672.
c. Threaded according to modified iron pipe standards, ANSI 2.1.

F. PVC Pipe, Waste and Vent

1. ASTM D-2665, DWV pipe and fittings.

2. Joints

a. All sizes above grade, 3 inches and smaller below grade: Sleeve type couplings and socket joints (ASTM D-2466) with solvent (ASTM D-2565) welds.
b. Larger than 3 inches below grade: Bell-to-plain ends with lubricated rubber ring push-on joints, ASTM D-2672.
c. Threaded according to modified iron pipe standards, ANSI 2.1.

G. Copper Tubing, Waste and Vent:

1. ASTM B306, Grade DWV

2. Fittings

a. Cast Bronze, ANSI B16.23
b. Wrought Copper, ANSI B16.29

3. Joints: Solder or brazed

H. Red Brass Pipe

1. ASTM B-43, regular weight.

2. Fittings:

a. Brass or Bronze.

3. Joints: NPT Screw Joints

2.02 PIPE SUPPORTS

A. Suspension Hangers (For Use Above Grade)

1. Adjustable wrought steel clevis type.

2. Copper plated for all hangers in direct contact with copper lines.

	2-1/2 Inch IPS and Smaller	3 inch IPS and Greater	Copper/Brass Piping, All Sizes
Grinnell	Fig. 65	Fig. 260	Fig. CT 65
B-Line	Fig. 3104	Fig. 3100	Fig. 3104 CT
Persing	Fig. 230	Fig. 200	Fig. 220 CT

3. Adjustable steel yoke pipe roll.

   a. Grinnell Fig. 171/181
   b. B-Line Fig. B3110/B3114
   c. Persing Fig. 322/324

4. Pipe Covering Protection Sleeves for Insulated Pipe

   a. Grinnell Fig. 167 Series
   b. B-Line Fig. 35L Series
   c. Persing Fig. 400 Series

5. Pipe Covering Protection Saddles For Insulated Pipe

   a. Grinnell Fig. 160 Series
   b. B-Line Fig. 3160 Series
   c. Persing Fig. 400 Series

6. Pipe Protection/Thermal Insulation Hanger Shields for Insulated Pipe.

   a. B-Line Fig. B3195 Series
   b. Insul-shield
   c. Pipe Shields
   d. Uni-grip

7. Hanger Rods

   a. ASTM A36.
   b. Hanger rod sizes:

Pipe Size	Hanger Rod Diameter
2 inch and smaller	3/8 inch
2-1/2 inch to 3-1/2 inch	1/2 inch
4 inch to 5 inch	5/8 inch
6 inch	3/4 inch
8 inch	7/8 inch
Over 8 inch	As per Hanger Manufacturer Recommendations

B. Wall Brackets:

1. Welded steel with capacity as required:

   a. Grinnell Fig. 194/195/196/Clip Fig. 193
   b. B-Line Fig. B3063/B3068/B3067/Clip Fig. B3063 CP
   c. Persing Fig. 153/151/153/Clip Fig. 153 C

C. Preformed Metal Framing Channels:

1. Continuous slotted steel framing channel in gauge and size for capacities required complete with the matching fittings, nuts, bolts and hangers as shown on the drawings.

2. Approved Manufacturers and Models: Subject to compliance with the above specified requirements.

   a. Unistrut
   b. Superstrut
   c. B-Line

2.03 CEILING, WALL AND FLOOR PLATES (Escutcheons)

A. Pipe Penetrations:

1. Hinged snap-on style.
2. 3/4 Inch IPS and Smaller, Chromium plated brass.
3. 1 inch IPS and Larger, Chrome Plated Steel.
4. Sized to fit snugly around uncovered pipe, pipe covering, or sleeve extensions as each location necessitates.

B. Hanger Rod Entrance, Finished Room Ceilings

1. Spring ceiling plates.
2. Chrome plated brass.

PART 3 - EXECUTION

3.01 PIPING SERVICE SCHEDULE

A. Piping shall be provided as follows:

SERVICE	MATERIAL
1. Sanitary sewers under building to 5' outside building.	Hubbed Cast Iron Soil Pipe
2. Above ground soil, waste, vent and downspouts, 2" diameter and larger.	Hubbed Cast Iron Soil Pipe
3. Above ground soil, waste, vent and downspouts, 1-1/2" diameter and smaller	Schedule 40 PVC, DMV in walls only; PVC not allowed in plenums or Copper Tubing, Type DMV
4. Underground domestic water 3" diameter and smaller	Copper Tubing, Type K
5. Above ground domestic water	Copper Tubing, Type L
6. Above ground sanitary vents	Schedule 40 PVC in walls only; PVC not allowed in plenums or Copper Tubing, Type DMV
7. Exposed piping connections for	Brass pipe, Schedule 40, Chromium plated

SERVICE	MATERIAL
plumbing fixtures	
8. Natural gas, propane	Black steel with factory applied corrosion resistant coating and wrapping when underground.
9. Coil Condensate piping-not in plenum areas	Schedule 40, PVC, DWV, Solvent weld (glued) joints
10. Refrigerants	Copper, Type L, nitrogen charged and sealed fittings, wrought copper

3.02 ELEVATIONS, GRADES AND LINES

A. Pipe Bury

1. Where definite grades, elevations or profiles are not indicated on the Drawings, install pipelines at the following depths, top outside center pipe to finish ground surface:

Fluid in Pipe	Minimum Earth Cover
Water	3' – 0"
Wastewater, storm and sanitary	2' – 6"
Gas	1' – 6"

3.03 EXCAVATING AND BACKFILLING

A. Contractor's Responsibility

1. Each Contractor performing work of any category is responsible for the excavation and backfilling necessary for installation of his work.
2. Perform excavation of every character of sub-surface material encountered, including frangible rock, solid rock, rubble, existing foundations, footings, bases, fluid sand, and muck. The nature of material excavated is not cause for charge in lump sum price.
3. Provide sheathing and bracing as required for protection of workmen, for protection of work installed in the excavation and for compliance with regulatory agency rules.
4. Remove and dispose of surplus excavated material, away from the premises, in a manner that conforms to local regulations. Any surplus earth or materials not removed promptly by the Contractor will be removed by others as directed by the Architect/Engineer and the cost of the removal charged to the Contractor.

B. General

1. Excavation and backfilling in streets and parkways shall be in accordance with the requirements of the City or governing body having jurisdiction.
2. Excavations are to be conducted that no walls or footings are disturbed or injured and with a minimum of disturbances to the sub-grade.

3. No power trenching equipment will be permitted inside the building lines, except upon written permission of the Architect/Engineer.
4. Maintain all trenches and excavations free of standing water. Provide all pumping equipment, labor and energy for operating same.
5. Divert dewatering apparatus discharge to natural drainage courses, curbs or storm sewers, not to sanitary sewers.
6. Fill materials; fill placement and compaction procedures are subject to the approval of the Architect/Engineer.
7. If cinder fill is unexpectedly encountered, notify the Architect/Engineer. All pipe and conduits installed in cinder fill shall be encased in six (6) inch thickness of 3000 PSI, normal weight concrete.
8. No piping or other work shall be covered until inspected, tested and reviewed by the Architect/Engineer.

C. Pipeline trenches below concrete slabs on grade or paved area.

1. Excavate 4 inches deeper than planned outside bottom center of pipe.
2. Place a layer of bank sand, or approved equivalent, 4 inches nominal thickness, between trench bottom and pipe to act as uniform support pad and spacer.
3. Fill around and over installed pipe with compacted sand or other approved granular material to underside of concrete slab or base course.
4. Backfill material shall be placed in successive 8 inch thick layers and each layer compacted by pneumatic or mechanical tampers to 90 percent of maximum dry density as established by Modified Proctor Test (ASTM D-1557) for cohesionless soils and 90 percent for cohesive soils.

D. Pipeline trenches through unpaved areas.

1. Provide pipe bedding and backfill material as specified in preceding subparagraph, except that backfill shall terminate 9 inches from the top of the trench excavation.
2. The top 9 inches of the excavation shall be restored with a material type to match the existing materials.
3. In the case of trenching through natural earth or previously backfilled areas, the backfill shall be compacted and mounded 6 inches above existing grade to allow for settlement.

3.04 SUPPORT OF UNDERGROUND PIPING

A. Where fill or loose soil of shallow depth is encountered, over-excavate down to firm undisturbed earth and backfill to the proper elevation with bank sand or crushed stone compacted to provide a firm support for the pipelines.

B. Where deep fill or large areas of unstable soil is encountered, support the pipe at least every 10 feet - 0 inch (at each hub of cast iron soil pipe and cast iron water pipe) on concrete piers or concrete blocks with footings set on undisturbed earth, and fill the area between the piers with firmly compacted granular material.

C. At the foot of each plumbing riser, provide a concrete foundation with base set on solid earth for support of the stack.

D. Set all equipment bases, basins, and similar structures on solid undisturbed earth and provide substantial bases.

1. Where loose fill or unstable soil is encountered, provide concrete foundations, properly reinforced and carried down to firm bearing with footings set on undisturbed earth.
2. Design and construction of all bases and foundations must be reviewed by the Architect/Engineer.

3.05 CUTTING, DRILLING AND PATCHING

A. Each Contractor shall do all cutting and drilling that is required in order that its work may be properly installed and it shall do all patching and repairing required to restore all surfaces to their original condition.

B. Where holes are required, these shall be cut in a careful manner and the openings kept to an absolute minimum.

C. The cutting and drilling into structural members or slabs may be accomplished only upon the prior written concurrence of the Architect/Engineer.

D. Openings in a slab on grade shall be made by scoring with a concrete saw followed by a chiseled clean break. Such floor openings shall be restored using fully compacted granular sub-grade and concrete bonded to the vertical pipe installed through the floor. No sleeve is to be placed in such case and concrete shall be sloped upward around the pipe to prevent water ponding at that point.

E. All patching and repairing shall be done by experienced men in the particular trades to which the respective kinds of work belong; and shall be neatly made, restoring the area to its original condition to the satisfaction of the Architect/Engineer.

3.06 FLOOR AND WALL PENETRATIONS

A. Provide noncombustible seals around pipe and duct penetrations for both new and existing construction at:

1. All Floors
2. Exterior Walls
3. Below-Grade Walls
4. 1 or 2-Hour and Greater Fire Rated Walls
5. Smoke Partition Walls
6. Where Designated by Code

B. Noncombustible pipe penetrations shall consist of:

1. Pipe sleeves.

2. Fireproof fill in annular space.

3. Surface sealing compound.

4. Provide pipe sleeves for the following:

   a. All new construction.
   b. Existing construction except where a smooth core drilled hole may be obtained.

5. Pipe Sleeve Material:

   a. Concrete Construction: Steel pipe sleeve with square welded steel plate extending no less than 6" beyond sleeve, all rust proofed.
   b. Masonry Construction: Galvanized Steel Pipe
   c. Wallboard or Plaster Construction: 26 gauge galvanized steel.

6. Pipe Sleeve or Core Drill Size:

   a. Diameter great enough to leave 1/2 inch clearance all around:

      1) Pipe not to be covered.
      2) Covering of insulated pipe.

7. Pipe Sleeve Length:

   a. Length to suit wall or floor thickness.

      1) In walls, ends flush with each wall face.
      2) Underside of floors, extend downward approximately 1 inch below bottom of floor surface.
      3) Above floors, extend upward approximately 3 inch above finished floor surface.

8. Annular Space Filler For Pipes:

   a. Below-Grade Exterior Walls

      1) Mechanical seals consisting of synthetic rubber links with plated steel bolts and Delrin pressure plates that provide hydrostatic sealing.

   b. All Other Walls and Floors

      1) Fire rated caulking compound designed expressly for this purpose.
      2) Mechanical seals described above.

c. Approved Manufacturers and Models: Subject to compliance with the above specified requirements.

1) Cherne Ind. - Gripper 1" - 8"
2) Thunderline - Link Seal
3) Instafoam - Front Pak

C. All Other Wall Pipe Penetrations

1. Pipe Penetrations consist of:

a. Finished and unfinished space: Pipe sleeve as described in noncombustible pipe penetrations.
b. 1/2" annular space between pipe and wall.

3.07 GENERAL ARRANGEMENT OF PIPING SYSTEMS

A. All piping shall be run as directly as possible straight and plumb, at uniform grades, so that the systems may be properly drained.

B. All piping shall be run at right angles, or parallel to walls. Offsets shall be made by means of proper fittings. The use of bent pipe will not be accepted.

C. Do not run piping through transformer vaults, elevator equipment rooms or other electrical or electronic equipment spaces and enclosures. Do not run piping over electrical panels.

3.08 EXPANSION AND CONTRACTION OF PIPE

A. Provide allowances for expansion and contraction of installed piping. Install piping in a manner that will not cause more than negligible stress nor cause leaks due to thermal expansion and contraction. Movement of pipe shall not result in noise generation.

B. Do not use slip type expansion joints on pipelines within the building.

3.09 PIPE JOINTING

A. Cleaning:

1. Care shall be taken to keep pipe compound and all other foreign matter from entering the interior of the piping. Each section of pipe and all fittings shall be carefully inspected for dirt, grease, or other foreign matter on the inside. They shall be properly cleaned before assembly.
2. Thoroughly clean the piping systems after completion to the satisfaction of the Architect/Engineer.

B. Threaded Pipe:

1. Threads shall be full and clean cut, and ends of pipe shall be reamed.

2. When screwed joints are assembled, the male thread shall be thoroughly coated with jointing compound to serve as a joint sealer and as a primer for the exposed threads.

3. Approved Manufacturers and Models: Subject to compliance with the above specified requirements.

   a. Hercules - TFE Pipe Joint or Real Tuff
   b. Markal Company
   c. Rector Seal - 100% Virgin

C. Bell and Spigot Joints:

1. Joints in bell and spigot cast iron soil pipe shall be made by ramming a ring of oakum into the bell to within 1-1/2 inches of the face of the bell. The bell then shall be poured full at one pouring with molten lead and caulked tight. Trim lead flush with the end of the bell.
2. Compression type joints for bell and spigot cast iron soil pipe made with approved type neoprene insert gaskets.

D. No-Hub Soil Pipe Joints:

1. Joints shall be made with a neoprene gasket covered by a corrugated metal stainless shield secured by two (2) or more stainless steel bands or clamps.

E. Copper Tubing Joints:

1. Soldered Joints

   a. Solder: 95-5 on all lines except refrigerant lines; silver solder on refrigerant lines.
   b. Clean mating surfaces of tube and fitting to bright sheen and apply flux.
   c. Apply solder and heat until the molten solder is drawn into the joint by capillarity and the connection is tight.

3.10 SUPPORT OF INTERIOR PIPING

A. All piping shall be supported as specified herein. All structural steel, hanger rods, turnbuckles, beam clamps, angle iron clips, inserts, brackets, floor bases, supports and bracing shall be provided.

B. Horizontal suspended piping shall be supported with adjustable hanger assemblies. Provide the specified clevis type with weight bearing insulation and protection shield. All hanger rods shall have enough length and threaded length to allow adjustment.

C. Perforated strap iron hangers, band iron, or wire will not be accepted.

D. Spacing of hangers or other supports:

	Maximum Spacing		
Pipe Sizes	Ferrous Pipe	Copper Tubing	Polypropylene, PVC Pipe
½ inch - 1 inch	6 feet	5 feet	6 feet
1-1/4 inch-2 inches	9 feet	8 feet	9 feet
2-1/2 inch - 3-1/2 inches	12 feet	8 feet	10 feet
4 inches - 6 inches	14 feet	8 feet	10 feet
8 inches - 14 inches	20 feet		10 feet
Over 14 Inches	As per Pipe Manufacturers Recommendations		

E. Horizontal pipe with compression or clamp joints shall be supported by an approved hanger not less than eighteen inches from the joint. See Paragraph "Pipe Supports" this Section.

F. Securely fasten hanger supports to structural members by approved beam clamps and clips, concrete inserts, anchors, or other appropriate methods reviewed by the Architect/Engineer. Locate concrete inserts or anchors to miss re-bars. Do not locate inserts or anchors closer than 6" apart.

G. Use bracket type hanger fastened to walls to support piping running adjacent to walls and not supported from ceilings.

H. Pipe hangers must be cleaned and painted with rust resistant paint before installation.

I. Where necessary to secure piping so as to control direction of expansion, provide welded type pipe anchors of design as will meet with the satisfaction of the Architect/Engineer, securely attached to the building construction and welded to the pipe.

J. Protection saddles shall not be used on insulated piping with vapor barriers. Continuity of vapor barrier shall be maintained at all joints, connections, hangers and shield.

3.11 WELDING

A. Welded pipe joints shall be made by the oxy-acetylene or electric process in accordance with ASME B31.9-1982.

B. Welding shall be done with good quality modern welding equipment, by competent operators, and in thorough, first class manner, conforming to AWS Standards.

C. Furnish proof of the competency of each welding operator for both field and shop welds. All welding operators shall pass a standard qualification test such as A.S.M.E., A.W.S. or Hartford Insurance Company procedure and tests.

D. Filler-metal for the welding process shall conform to ASTM A233 "Specification for Mild Steel Arc-Welding Electrodes." Classification of electrodes shall be one of the following: E6010, E6015, E7016, E7018.

E. When welding will be performed, precautionary measures shall be taken to prevent fire. Remove flammable materials and debris from the area. Provide an appropriate extinguisher nearby.

F. Pipes shall be cut short and cold sprung into place before welding or fabricating to compensate for expansion of lines when hot.

G. Welds shall be of the single vee butt type. Pipe ends shall be shop beveled to 45 degrees to within 1/16 inch of the inside wall surface.

H. The abutting ends of the joints shall be separated before welding to permit complete fusion, tacked in two or more points to maintain alignment, and welded. Welding shall be continuous around the pipe.

I. Welds shall be of sound weld metal, thoroughly fused into the ends of the pipe and to the bottom of the vee, and shall be built up in excess of the pipe wall to give a reinforcement of one-quarter (1/4) the pipe wall thickness and in such a manner that one weld metal will present a gradual increase in thickness from the surface of the pipe to the center of the weld. The minimum width of the weld shall be 2-1/2 times the pipe wall thickness.

J. The fillet welds from flanges of fittings shall be fused into the pipe and plate for a minimum distance of 1-1/2 times the pipe wall thickness and shall be built up to present a minimum throat thickness of depth of weld of 1-1/4 times the pipe wall thickness.

K. Branch connections shall be fabricated by welding. Openings cut into pipe for welded connections shall be accurately made to give carefully matched intersections and welding fittings shall be carefully welded into the pipe system.

L. Welding ells shall be used at all turns in welded pipe lines; no mitered ells will be approved.

M. Where welded mains are smaller than three times the branch diameter, branch connections shall be made with welded tees. Appropriate weld fittings shall be used for all other branch connections.

3.12 CLEANING THE PIPING SYSTEMS

A. Before pipe covering is applied and final tests are made, flush out the piping systems thoroughly to remove dirt, sand, oil and other deleterious substances, for

sufficient time to thoroughly clean the apparatus and piping. Make the temporary connections for this purpose.

B. Take care not to get dirt, grease, on the floors or walls. Damage done shall be repaired to the satisfaction of the Architect/Engineer.

C. After a period of operation, all defects or damages that may have developed in the equipment and apparatus as result of the cleaning out process shall be corrected to the satisfaction of the Architect/Engineer.

3.13 INSPECTION AND TESTING

A. All piping systems shall be tested for leaks and subject to Architect/Engineer's written approval before covering is applied and before backfilling or concealing within the structure.

B. Notify the Architect/Engineer and Owner three working days before the tests are to be made. Concealed work shall remain uncovered until specified tests have been completed; when necessary, tests on portions of the work may be made so that those portions of the work may be concealed after being proven satisfactory. All tests shall be made in the presence of the Architect/Engineer. Repairs or defects that are discovered as a result of inspection or tests shall be made with new materials. Caulking of screwed joints, cracks, or holes will not be accepted. Tests shall be repeated until all defects have been eliminated. Furnish the equipment, material, and labor to accomplish the tests.

C. A water pressure test shall be applied to all parts of the drainage systems, before the pipes are concealed or fixtures set in place. The test may be applied in sections. All openings of each system to be tested shall be tightly closed except the highest openings above the roof and the entire system or sub-system shall be filled with water up to the overflow point of this highest opening. All parts of the system shall be subjected to not less than 10 feet of hydrostatic head except the uppermost 10 feet of the piping directly below the opening. The water shall remain in the system for not less than 30 minutes after which time no leaks at any joints or lowering of the water level at the overflow shall be visible.

D. Cap all open connections in the water piping systems and fill the sections of piping to be tested with water at 100 pounds per square inch gauge pressure registered at ground floor level. The system shall be carefully inspected and all defective material replaced and leaks repaired. The test pressure shall be held for a minimum period of 1-hour without variation in pressure except that which is due to changes in temperature.

E. Cap up all open connections in the gas piping system. A suitable air chamber shall be attached to the system and compressed air introduced until a pressure of 125 pounds per square inch is reached. The system shall be isolated before the test begins. The test pressure shall be held for a minimum period of 1 hour without variation in pressure except that which is due to changes in temperature.

F. Welding piping shall be subject to a hydrostatic test of not less than 100 pounds per square inch, or 1-1/2 times the working pressure, which ever is the greater at which pressure all welded joints shall be hammered with a three pound hammer, the blows being struck with a sufficient force to jar the pipe and joint, but not so hard as to injure the piping. All welds shall pass this test without showing leaks or any defects.

G. All preliminary tests which the Contractor may make without such tests being observed by the Architect/Engineer will not be accepted as meeting this Specification, irrespective of the alleged results.

END 15060

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Includes:

1. Valves and Cocks for Plumbing, HVAC, and Fire Protection Systems.

1.02 QUALITY ASSURANCE

A. All valves shall be of the same manufacturer unless otherwise specified.

B. Comply with A.S.M.E., B31.9 for building services piping and A.S.M.E. B31.1 for power piping.

C. Comply with MSS standard practices.

1.03 SUBMITTALS

A. Submit in accordance with 15010.

B. Product Data:

1. All Items Specified Herein.

1.04 DEFINITIONS

A. Abbreviations:

1. PSI – pounds per square inch
2. WSP – working steam pressure
3. CWP – cold working pressure
4. WOG – water oil gas
5. SWP – steam working pressure
6. CCW – counter clockwise
7. NPT – national pipe thread
8. LPG – liquid propane gas

PART 2 - PRODUCTS

2.01 VALVES AND COCKS

A. All valves shall be supplied with identification tags supplied by manufacturer. All valves shall be same size as connected piping, except as noted otherwise.

B. Gate Valve, All Pipe Material, 2 Inch and Smaller Sizes, Low Pressure:

1. Bronze body, union and bonnet, bronze mounted gate or wedge style.

2. Rising stem, hand-wheel operated, open CCW, conventional packing gland, re-packable under pressure.

3. Pressure rating: 150 psi WSP; 300 psi CWP.

4. N.P.T. screw ends, ANSI B2.1.

5. Approved Manufacturer and Model: Subject to compliance with the above specified requirements.

   a. NIBCO - Number T134
   b. Approved equal.

C. Gate Valve, All Pipe Material, 2-1/2 Inch and Larger Sizes, Low Pressure:

1. Iron body, bronze trim, outside screw and yoke, wedge gate style.

2. Hand-wheel operated, rising stem, open CCW.

3. Flanged ends, ANSI B.16.10.

4. Pressure Rating: 125 psi WSP; 200 psi CWP.

5. Approved Manufacturer and Model: Subject to compliance with the above specified requirements.

   a. NIBCO - Number F-617-0
   b. Approved equal.

D. Ball Valves, All Pipe Material, 2 Inch and Smaller Sizes:

1. 3-Piece Bronze body with 316 stainless steel trim, full-port ball.

2. 316 Stainless steel ball with TFE seats.

3. One-quarter, turn lever handle.

4. Provide with memory stop where necessary for throttling applications (such as coil bypass lines).

5. Pressure Rating: 150 psi WSP, 600 CWP.

6. Approved Manufacturer and Model: Subject to compliance with the above specified requirements.

   a. NIBCO - Number T595 -Y66 (When required UL listed for LPG and Natural Gas service, provide NIBCO #T-595-YUL)
   b. Approved equal.

E. Angle Valves, Plumbing Fixture Supply:

1. Wheel or 4 arm handle.

2. Brass body, polished chromium plated.

3. Approved Manufacturers and Models: Subject to compliance with the above specified requirements.

a. American Standard - 8253.015
b. Eljer - 801-0791
c. Kohler - K-7662

F. Angle Valves, Plumbing Fixture Supply:

1. Loose key handle and lock shield cap.

2. Brass body, polished chromium plated.

3. Approved Manufacturers and Models: Subject to compliance with the above specified requirements.

a. American Standard - 8253.011
b. Eljer - 801-0796
c. Kohler - K-7666.

G. Gas Cocks, All Pipe Material, All Sizes:

1. Lubricated plug cock.

2. Full port, semi-steel body, N.P.T. screwed ends.

3. Pressure rating: 200 pounds per square inch WOG.

4. Lubricant:

a. Compatible with natural and liquified petroleum gas.
b. Provide 2 spare sticks per valve.

5. Approved Manufacturers and Models: Subject to compliance with the above specified requirements.

a. Homestead - Number 601
b. Powell - Number 2202
c. Walworth - Number 1700

PART 3 - EXECUTION

3.01 SELECTION

A. Valves shall be rated for the pressure, temperature, and flow required for the line for which it is installed.

B. Type of valve shall be as indicated on the drawings and as recommended by the valve manufacturer for its intended use.

C. The Contractor shall assign each valve a tag number and document on As-Built drawings and valve schedule.

3.02 INSTALLATION

A. Install in strict accordance with manufacturer's recommendation.

B. Test all valves as part of tests described in Section 15060.

C. Do not insulate or conceal valves until inspected by Architect/Engineer.

END 15100

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Includes

1. Insulation of Domestic Water Piping.
2. Insulation of Sanitary, Waste and Storm Piping
3. Insulation of hot and cold equipment.
4. Pipe Insulation of refrigerant piping.
5. Insulation of ductwork.

1.02 QUALITY ASSURANCE

A. All insulation, jacket and adhesive shall have a fire and smoke hazard ratings as tested under ASTM E-84, NFPA 255, and UL 723 not exceeding:

Flame Spread:	25
Fuel Contributed:	50
Smoke Developed:	50

B. Exceptions:

1. PVC Fittings Covers

1.03 SUBMITTALS

A. In accord with Section 15010.

B. Product Data:

1. Type A Insulation
2. Type B Insulation
3. Accessories

1.04 DEFINITIONS

A. The term "Storm Drainage Conductor" refers to that portion of the storm drain interior to the building, between the roof drain body and where the line goes below grade.

PART 2 - PRODUCTS

2.01 PIPING INSULATION

A. Type A:

1. Glass fiber, rigid molded sectional pipe covering, conforming to ASTM C547, Class II, and "Mineral Fiber Preformed Pipe Insulation".

2. Conductivity (k) equals approximately 0.23 BTU/HR.-SF.-°F per inch thickness at 75 degrees F.

3. Acceptable Manufacturers and Models: Subject to compliance with the above specified requirements.

   a. Manville Corp. - "Micro-Lok 650-AP-T".
   b. Owens Corning Fiberglas Corp. - "One Piece" 25 ASJ/SSII".
   c. Certain-Teed - "500 ° Snap-ON".

B. Type B:

1. Closed cell, flexible thermal elastomeric conforming to ASTM C534, "Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form."

2. Conductivity (k) equals approximately 0.27 BTU/HR.-SF.-°F per inch thickness at 75 degrees F.

3. Acceptable Manufacturers and Models: Subject to compliance with the above specified requirements.

   a. Armstrong - "Armaflex".
   b. B.F. Goodrich - "Flexible Insulation Tubing and Sheeting".
   c. Manville Corp. - "Aerotube"

2.02 DUCTWORK INSULATION

A. Type F

1. Flexible mineral fiber blanket conforming to ASTM C553, Type I, Class B-5 (up to 400 degrees F.), 0.75 pounds/CU. FT. nominal.

2. Conductivity (k) equals approximately 0.24 (BTU-IN/HR.-SF.-°F) per inch thickness at 75 degrees F.

3. Integral UL rated vapor barrier of:

   a. Aluminum foil reinforced with fiberglass scrim laminated to 30 lb. kraft paper.
   b. Class I white vinyl 0.004 inch thick, where specified.

4. Approved Manufacturers and Trade Names

   a. Certainteed - "Universal"
   b. Manville Corp. - "Microlite"

c. Owens Corning - "Duct Wrap"
d. Approved Equal.

2.03 INSULATION ACCESSORIES

A. The following accessories shall be used in the application of the thermal insulations specified under this Section:

1. PVC Fittings Covers

a. Certain-Teed - "Snap Form"
b. Manville Corp. - "Zeston"
c. Stauffer - "Ultra Jacket"
d. Approved Equal

2. Vapor Barrier Lap Adhesive

a. Benjamin Foster 82-07
b. Chicago Mastic 17-465
c. Insul-Coustic IC-215
d. Approved Equal

3. Vapor Seal Mastic

a. Benjamin Foster 30-35
b. Chicago Mastic 17-475
c. Insul-Coustic I-C 501
d. Approved Equal

4. Lagging Adhesive

a. Benjamin Foster 30-36
b. Chicago Mastic 16-400
c. Insul-Coustic IC-102
d. Approved Equal

5. Glass Cloth Jacket

a. Benjamin Foster
b. Insul-Coustic
c. Manville Corp.
d. Owens-Corning
e. Approved Equal

6. Wire

a. Cold Piping - Number 16 soft copper.

b. Hot Piping - Number 20 gage soft annealed galvanized steel.

7. Insulation Bonding Adhesive (To Metal)

   a. Benjamin Foster85-15
   b. Chicago Matic 17-460
   c. Insul-Coustic I-C 201
   d. Approved Equal

8. Insulating and Finishing Cement

   a. Fibrex, Inc. - FBX Super Blend Cement
   b. Keene Corp. - Super Powerhouse
   c. Manville Corp. - No. 375 Insulating and Finishing Cement
   d. Pabco Insulation
   e. Approved Equal

9. Mechanical Fasteners: Welded or adhered pins with speed clip washers.

   a. Gripnail Corp.
   b. Nelson Stud Co.
   c. Stick Klip Manufacturing Co.
   d. Approved Equal

10. Bands for Equipment

    a. Outside diameter of insulation is less than 24 inch: 1/2 inch x 0.020 inch ga.) galvanized steel.
    b. Where diameter is 24 inches or larger: 3/4 inch x 0.020 inch.

11. Bands for Piping: 1/2 inch x 0.020 inch aluminum.

PART 3 - EXECUTION

3.01 INSULATION SCHEDULE

SERVICE	APPLICABILITY	INSULATION
Coil Condensate Lines (except in plenums or fire wall penetrations)	All IPS	3/4 inch thick Type B
Horizontal Storm Leaders	All IPS	1 inch thick Type A
Refrigerant Suction Lines & Valves (except in plenums or fire wall or floor penetrations)	All IPS	1 inch thick Type B
Domestic Hot Water, Tempered Water, Re-circulated Hot Water & Service Hot Water	2 inch IPS or less	1 inch thick Type A
Low Pressure Supply & Return Ducts and Preconditioned OSA ducts (in	All	2 inch thick Type F with Foil/ Scrim/Kraft Facing

SERVICE	APPLICABILITY	INSULATION
concealed areas)		

Notes:

1. Outdoor air (unconditioned), ventilating and exhaust ductwork shall not be insulated, unless otherwise noted on the Drawings or in Section 15890 of these specifications.

3.02 PIPING, INSULATION, GENERAL REQUIREMENTS

A. Preparation

1. Do not apply insulation until piping has been leak tested.
2. All surfaces to be insulated shall be dry and free of loose scale, rust, dirt, oil or water.

B. Application

1. Insulation shall be installed in a smooth, clean workmanlike manner. Joints shall be tight and finished smooth without fishmouths.
2. Insulation shall fit tightly against the surface to which it is applied to prevent air circulation between the insulation and the pipe or equipment to which it is applied.
3. Insulation applied to cold piping or equipment shall be completely vapor sealed, free of pin holes or other openings.
4. Do not use wet insulation materials.
5. All longitudinal joints on vertical pipe runs shall be staggered.
6. Apply insulation so as to permit expansion or contraction of pipe lines without causing damage to insulation or surface finish.
7. Do not apply mastic or adhesive until all previous applications of mastic and adhesives have thoroughly dried.
8. No bands or staples shall be provided on covering.
9. The adhesive used in connection with all covering work shall contain an approved vermin and rodent-proof ingredient.
10. Provide 24 gauge sheetmetal saddle between the pipe hanger/support and the exterior of the insulation. Saddle length shall be the same as insulation inserts.

C. Application at Fittings

1. Insulation of flanges and flanged fittings shall overlap adjacent pipe covering at least 1 inch. Valves shall be insulated up to the gland only.
2. Pipe line strainers shall be insulated in such a manner as to permit removal of strainer basket without disturbing insulation of the strainer body.
3. Insulation adjacent to uninsulated flanges shall be tapered back and neatly finished so as to allow access to and removal of bolts without injury to covering.

3.03 TYPE A INSULATION INSTALLATION

A. Tightly butt together sections of insulation on pipe runs sealing longitudinal seams of jacket with vapor barrier adhesive. Seal end joints with 4 inch wide straps of vapor barrier tape. Seal off ends of insulation with vapor seal mastic at valves, fittings and flanges. No further finish required.

B. PVC fitting jackets shall be used when they are available for the particular application. When molded coverings are not available, the coverings shall be fabricated in the field similar to equipment insulation.

C. Cold Piping

1. Cover valves, fittings and flanges with insulation having the same thickness as adjacent pipe covering, securing in place with copper wire loops, twisting ends and embedding in insulation. Apply a PVC jacket and finish joints with a 1/16 inch thick seal coat of vapor seal mastic. Apply a pressure sensitive vapor barrier tape over the joint jacket.

D. Hot Piping

1. Cover valves, fittings and flanges with insulation similar to the adjacent pipe covering, securing in place with galvanized wire loops, twisting ends and embedding in insulation. Apply a PVC jacket and tape end joints to adjacent pipe insulation.
2. Do not use PVC fitting jackets where the surface of the insulation is above 150 degrees F.

E. Exterior Piping

1. Exterior above grade water piping shall be finished with a weatherproof jacket and an aluminum jacket. Lap and seal joints as per manufacturer's instructions. Place laps to shed water.

3.04 TYPE B INSULATION INSTALLATION

A. Type B insulation shall be slipped on the pipe prior to connection, and the butt joints shall be sealed. Where the slip-on technique is not possible, the insulation shall be carefully slit and applied to the pipe.

B. All joints shall be sealed with the manufacturer's recommended adhesive.

C. Do not apply Type B insulation in multiple layers.

D. Type B insulation shall not be used in plenums or fire wall penetrations.

E. This Contractor shall paint Type B insulation exterior to the building with two coats of a vinyl lacquer paint recommended by the insulation manufacturer for protection against ultraviolet degradation and shall be flexible with no cracking.

3.05 HANGERS

A. Continue insulation through pipe hangers. Provide either rigid insulation inserts or sheet metal inserts at all outside pipe hangers. Provide rigid insulation inserts for piping operating below 60 degrees F. and sheet metal inserts for piping above 60 degrees F.

B. Rigid insulation or wood inserts between the pipe and pipe hanger shall be of a thickness equal to the adjoining insulation and shall be provided with vapor barrier where required. Insulation insert shall not be less than the following lengths:

1/2" to 2-1/2" pipe size	10 Inches Long
3" to 6" pipe size	12 Inches Long
8" to 10" pipe size	16 Inches Long
12" and over	22 Inches Long

C. Inserts for cold piping shall have a vapor barrier facing of the same material as the adjacent pipe insulation. Seal inserts into insulation with vapor seal mastic.

D. Sheet metal inserts shall be of steel sheet. Gauge shall conform to manufacturer's recommendation for pipe size. Sheet metal inserts shall have insulation filler of the same material as the adjacent pipe insulation.

3.06 PIPE SLEEVES

A. Pipe insulation and vapor barrier shall be continuous through sleeves in walls and floors.

B. Type B insulation shall not be used in sleeves through fire walls or fire rated (2 hour) floor systems. Use Type A or Type C through the sleeve instead and vapor seal the joint between the two insulations.

C. Provide 26 gauge galvanized steel or 0.020 inch aluminum jacket over insulation on pipe passing through sleeves where sealant is required. See Section 15050.

D. Where penetrating interior walls, extend the metal jacket 2 inches out either side of the wall and secure each end with a metal band compressing the insulation slightly.

E. Where penetrating floors, extend the metal jacket 2 inches below the floor and 5 inches above the floor. Secure with metal bands.

3.07 TYPE F INSULATION INSTALLATION

A. Ductwork Insulation Application

1. Apply insulation tightly and smoothly to duct.
2. Secure insulation on the bottom of ducts and plenums and on the sides of plenums and other places where the insulation will sag.

3. Impale insulation over pins or anchors located not more than 18 inches apart and hold in place with washers and clips.
4. Cut off protruding pin after clips are secured and seal with aluminum backed pressure sensitive tape.
5. Apply insulation with joints tightly butted.
6. Seal all ductwork joints, punctures and fittings with fiberglass tape and a mastic type sealant containing a vapor barrier.
7. Cover all breaks, joints, punctures and voids with a vapor seal mastic and cover with a vapor barrier material identical to vapor barrier on the insulation.
8. Bevel insulation around name plates, access plates and doors.
9. Insulation shall be continuous through walls and floors except at fire dampers.

END 15250

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Includes

1. Connection of the sprinkler system to the incoming water service.
2. Complete wet pipe fire protection system as described by National Fire Codes, and all applicable sections and State and Local Codes.
3. Provisions of sprinkler system riser with alarm/check valve, backflow preventer and other appurtenances necessary to complete the system. Contractor shall be responsible for determining available flow and pressure in water utility distribution mains.
4. Design, by hydraulic calculations, sprinkler system mains, branch lines, sectional valves, and sprinkler heads locations, based on water flow densities shown on the drawings.
5. Fire alarm wiring to water flow detectors and flow switches.

1.02 QUALITY ASSURANCE

A. The fire protection system shall be installed by competent and experienced workmen and shall be in compliance with the National Fire Codes, State and Local Codes.

B. All references to NFPA (NFC) shall be the latest edition.

1.03 SUBMITTALS

A. In accordance with 15010.

B. Product Data:

1. Sprinkler heads.
2. Pipe & Fittings.
3. Alarm Check Valve.
4. Other Valves and Switches.
5. Extinguisher and Hose Valve Cabinets
6. Hose Connections
7. Pipe Hanger and Supports
8. Fire Department Connections

A. Shop Drawings:

1. Plans issued with construction documents constitute a record set of drawings showing general arrangement of piping, head locations, and other requirements including hydraulic calculations. They are engineering drawings, conceptual in nature only, and are not fabrication drawings. The Contractor shall submit detailed shop drawings as listed below:

a. Hydraulic Calculations
b. Sprinkler Head and Piping Design – Contractor shall provide detailed construction drawings in strict accordance with NFPA 13 requirements for approval by Architect/Engineer. Exact head locations shall be coordinated with Architectural reflected ceiling plan. Additional heads not shown on FP drawings, but required by Code shall be shown on coordination drawings. Contractor shall carefully coordinate all piping with Mechanical Subcontractors and Electrical connections with Electrical Contractor.

PART 2 - PRODUCTS

2.01 PIPE

A. Copper Tubing:

1. ASTM B88, Type L.

2. Joints: Brazed

a. Brazing Rod, AWS A5.8.

B. Steel Pipe:

1. ASTM A120 or ASTM A53, Schedule 40.

2. Uncoated black pipe unless otherwise noted.

3. Joints

a. Screwed, ANSI B2.1.
b. Welded, ANSI B31.10.
c. Flanged, ANSI B16.5.
d. Mechanical Joints

1) UL Listed or FM approved.
2) Mechanical grooves couplings or push-on couplings,
3) ASTM A-47.

4. Contractor's option ASTM A120 or ASTM A53, Schedule 40 and Schedule 10 pipe as allowed by NFPA 13.

C. Ductile iron cement lined interior - asphalt coated exterior for underground.

2.02 SPRINKLER HEADS

A. All heads shall have the following features:

1. Heads shall be heat responsive automatic type listed by UL and be FM approved.

2. 160 degrees fusible element. Provide higher temperature for heads located in danger zone as defined in NFPA Number 13 and FM 2-8.
3. Nominal 1/2 inch orifice. Standard brass body. Style as specified for the particular type.
4. Pattern, body deflectors capable of flowing Q = K times square foot of P, in which Q = U.S. gallons per minute water delivery through an open sprinkler head. K = 5.3 - 5.8, dimensional constant. P = Pounds per square inch residual gauge pressure at point of attachment of head inlet to pipe nipple or pipe fitting.
5. Capable of remaining closed and leak-proof at temperatures less than 160 degrees against 100 psig pressure.

B. Type A, Glass Bulb Upright:

1. Liquid filled frangible glass capsule style fusible element.

2. Upward spray pattern against deflector having edges cupped downward.

3. Unpolished chromium plated finish on brass, bronze or other copper alloy body.

4. 1/2 inch male N.P.T.

5. Acceptable Products

   a. Reliable Auto Sprinkler Company Model F Standard Upright.
   b. Viking Decor Upright Model M
   c. Grinnell - F980

C. Type B, Glass Bulb Pendant:

1. Liquid filled frangible glass capsule style fusible element.

2. Downward spray pattern against essentially flat deflector.

3. Unpolished chromium plated finish on copper alloy body.

4. Recessed cup or socket, for installation of head slightly above suspended ceiling surface. Cup or socket having open rim flush with ceiling.

5. 1/2 inch male NPT.

6. Acceptable Products

   a. Reliable Auto Sprinkler Company Model F Standard Pendant.
   b. Viking Decor Pendent - Model E-1
   c. Grinnell - F985

D. Type C, Sidewall:

1. Similar to Type A except for Deflector.
2. Directional pattern deflector; shielding spray from direction toward wall, directing spray outward, upward or downward.

E. Type D, Concealed Pendant

1. Metal fusible element.

2. Downward spray pattern against essentially flat deflector.

3. Mill finish, copper alloy body.

4. Recessed cup and cover plate for concealed installation.

5. Cover plate shall be factory painted to match the ceiling color or color as selected by Architect.

6. Approved Manufacturers and Models: Subject to compliance with the above specified requirements.

   a. Reliable Auto Sprinkler Co. - Model G1 concealed.
   b. Viking - Model F
   c. Grinnell - FR 946

F. Spare Sprinkler Heads:

1. Furnish in original shipping containers with identifying labels, twelve spare sprinkler heads and one installation tool of each type per NFPA requirements.

2.03 COMBINATION CHECK/ALARM VALVE

A. Listed by UL and Factory Mutual approved as a fire protection wet sprinkler system supervisory control device and for operation in a vertical pipeline, flow upward, with a check against downward flow.

B. Designed and fabricated for at least 175 psig cold water working pressure, 350 psig test pressure.

C. Cast iron body, bronze mounted. Moving parts, bushings and bearing of brass, bronze, stainless steel, rubber or neoprene. Bronze seat ring; rubber or neoprene faced disc ring.

D. Flanged ends, ANSI 16.1 Class 125. 1/16 inch thick full ring flange gaskets.

E. Tapping bosses integrally cast with valve body, with shop-tapped N.P.T. openings as follows:

1 above and 1 below valve seat, for pressure gauges.

1 above seat, for main drain.
1 above seat, for connection to retarding chamber.
1 below seat, for alarm test connection to retarding chamber.

F. Size same as connected pipeline indicated on Drawings.

G. Acceptable Products:

1. Central Model F.
2. Reliable Auto Sprinkler Company Model E.
3. Viking Model E.

2.04 ALARM RETARDING CHAMBER

A. Water holding tank expressly designed and manufactured for use between a fire protection wet sprinkler system check/alarm valve and a pressure actuated alarm switch, to reduce the possibility of false alarms due to instantaneous surges of flow or pressure.

B. Listed by UL and Factory Mutual approved.

C. Capacity approximately 2 gallons.

D. Corrosion resistant interior coating not deleterious to potable water.

E. Designed and manufactured for at least 150 psig cold water working pressure, 300 psig test pressure.

F. 3/4 inch NPT inlet, outlet and drain. Restricted orifices on inlet and outlet, sized and correlated to allow minor flow into chamber from system side of check/alarm valve, and bleed a lesser quantity to drain, so that chamber pressure does not increase significantly unless check/alarm valve opens widely in response to open sprinkler heads.

G. Acceptable Products:

1. Central Model F.
2. Reliable Auto Sprinkler Company Model E.
3. Viking Model B-2.

2.05 ALARM SWITCH

A. Water pressure rise closes electric circuit to alarm; open electric circuit on differential pressure drop.

B. UL listed.

C. Actuating pressure manually adjustable in range 2 to 20 pounds per square inch.

D. Hydraulic elements shall be capable of withstanding 300 pounds per square inch without appreciably affecting the settings.

E. Acceptable Products:

1. Central J7X.
2. Reliable Auto Sprinkler Company Model G Type 1.
3. Square D 9013-HRG 12-S6.
4. Viking Model Number UA-1011.

2.06 WATERFLOW DETECTORS AND FLOW SWITCHES

A. Provide a waterflow detector immediately downstream from each zone isolating control valve. Such indicators shall have the following features:

1. Listed by UL.

2. Detects sustained flow of water into zone.

3. Pipe insertion type. Flow detecting element in pipe, but no water in indicator chamber.

4. Element detects flow and actuates electric switch through time delay mechanism.

5. Adjustable time delay in 0 to 90 second range. Initial factory setting: 35 and 45 seconds.

6. Single pole double throw microswitch for 120V/60Hz/10/rated for 2 amps.

7. Annunciator, alarms and alarm relay specified in Section 16721 - Fire Alarms.

8. Install a 24 inch minimum downstream from zone isolating valve or pipe fitting, and in accordance with manufacturer's standards.

9. Acceptable Products

a. Central Series WFD
b. Viking Model Number BH-1001
c. Reliable Model J

2.07 ALARM

A. Electric gong for outdoor weatherproof mounting.

B. UL listed.

C. 6 inches diameter shell.

D. Sound output not less than 95 decibels each at 10 feet.

E. 120 volt 1 0/ a.c. circuit.

F. Acceptable Products:

1. Central N-CO-Bell.
2. Viking Type BH-1003-6
3. Reliable Model C

2.08 WATER PRESSURE GAUGES

A. Standard Bourdon style.

B. Dial diameter 3 inches to 3-1/2 inches.

C. Range 0 - 300 psi with no stop at 0.

D. Brass case.

E. Replaceable glass dial cover.

F. Black numerals on white face.

G. 1/4 inch male N.P.T. connection.

2.09 CHECK VALVES

A. Check valves within the building on system side of Fire Department hose connections shall have the following features:

1. Listed by UL.

2. Cast iron body, bronze mounted.

3. Brass to neoprene, rubber face on brass or bronze seats.

4. 175 psig cold water working pressure - 350 psig test pressure.

5. 3/4 inch N.P.T. tapped boss on bottom of body, inlet end.

6. Swing type.

7. Approved Manufacturers and Models: Subject to compliance with the above specified requirements.

a. Reliable - Model D
b. Central - Model 10
c. Viking - Model C-2

2.10 AUTOMATIC DRAIN VALVES

A. Automatic drain valves on inlet side of Fire Department connection check valves automatically open at no pressure on F.D. Siamese side and close upon pressure due to Fire Department pumper connection and action.

B. Bronze body.

C. 1/2 inch male N.P.T. ball drip style connection.

D. Outlet of automatic ball drip valve shall free fall through an air gap of 6 inches or more into a floor drain or cup connected to the building drainage pipe system.

E. Acceptable Products:

1. Allenco Number 2112.
2. Elkhart Number 701
3. Reliable Auto Sprinkler Company Model "C"

2.11 BACKFLOW PREVENTER

A. For direct water connections that may be subject to back pressure from non-potable liquids.

B. Valve shall work on reduced pressure principle and shall have test valves.

C. Provide a strainer upstream of and gate valves on both sides of backflow preventer.

D. Provide air gap, drain fitting and pipe open sight to nearest drain.

E. Approved Manufacturers and Models: Subject to compliance with the above specified requirements.

1. Wilkins - Model 575 RP, 575 M
2. Febco - Model 825, 825Y
3. Watts - No. 909

2.12 FIRE DEPARTMENT PUMPER CONNECTIONS

A. All connections shall have the following features:

1. Cast brass body and escutcheon.
2. Four (4) inlet heads, 7 inches on center, 2-1/2 inch inlets, 6 inch outlet. Bottom outlet manifold, horizontal style.
3. Female hose thread, local fire department adopted standards.
4. Individual drop clapper valve, each inlet.
5. Inlet cap with wrench lugs and chain, each inlet.

B. Flush Wall Style

1. Lettering on wall escutcheon "AUTO SPRINKLER FIRE DEPT. CONNECTION."

2. All exposed parts shall be polished brass.

3. Approved Manufacturers and Models: Subject to compliance with the above specified requirements.

   a. Potter-Roemer - 5200 Series
   b. Elkhart Number 781

PART 3 - EXECUTION

3.01 SPRINKLER SYSTEM

A. Provide a complete wet pipe automatic sprinkler fire protection system for all areas of the buildings except for the areas shown otherwise. The fire protection system shall be designed and installed in accord with all applicable sections of the National Fire Codes, State and Local Codes.

1. The Sprinkler Contractor shall field verify the available water flow and pressure at the utilities water connections. Size and capacity of fire pumps shall be adjusted, based on the contractors water flow and pressure investigation.
2. Locations and quantity of fire equipment, piping and sprinkler heads are general and schematic in nature. The Sprinkler Contractor by design and field coordination shall establish exact location and quantity of sprinkler components and sprinkler system.
3. Sprinkler heads shall be located in the center of the ceiling tiles. Coordinate exact locations with Architectural RCP, HVAC and electrical equipment prior to installation.
4. Piping support shall be per Section 15060 and as indicated on drawings.

B. Drain and Test Connections

1. Each fire protection water pipeline drain connection shall consist of:

   a. Pipeline tie in zone supply riser or equivalent header. Threaded, flanged, or mechanical coupling ends on running ends of tee, appropriate for the particular riser or header. Threaded side outlet of tee, N.P.T. standard.
   b. Drain pipe and angle valve connected to tee side outlet.

Riser or equivalent Header Pipe Size	4" and larger	3-1/2" to 2-1/2"	Less than 2-1/2"
Tee Side Outlet, Pipe Nipple, Angle Valve and Drain Pipe Size	2"	1-1/4"	3/4"

c. Angle Valve: Brass body, brass mounted, male N.P.T. ends, handwheel operated, open counterclockwise, vandal-protected removable handwheel.
d. Drain Pipe: Material and method of jointing same as used throughout system.

2. Test Connection

a. Provide test connection at the end of each section of the sprinkler system.
b. Test pipe shall be 1 inch diameter terminating in a smooth bore, 1/2 inch brass valved outlet, discharging to the atmosphere or through a suitable air gap to the drainage system.
c. Provide pressure gauge with valve cock.

C. Support of Piping

1. Provide hangers to securely support fire protection piping from building structure.
2. Hangers shall have a minimum load-carrying capacity of the weight of the water-filled piping plus two hundred-fifty (250) pounds applied at the point of support.
3. Location and installation of hangers shall comply with NFPA Number 13.

3.05 SPRINKLER GUARDS AND WATER SHIELDS

A. Provide guards on sprinklers within 7'-0" of finished floor or wherever sprinklers may be subject to mechanical damage such as mechanical and electrical rooms.

B. Provide all necessary guards on sprinklers as required by electrical inspector and elevator inspector as required in electrical rooms and elevator shafts.

3.06 PAINTING AND MARKING

A. Paint all piping not exposed in ceiling space red.

B. Provide all markings, nameplates, signs, and other indicators as required by the NFC. All signs shall be in strict accordance with NFC codes.

C. See Section 15060 for additional requirements.

3.07 TESTING

A. The system shall be cleaned, inspected, and tested per Section 15060 requirements.

B. The systems shall be tested in strict accordance with NFPA 13 requirements. Test results shall be submitted to Architect/Engineer for approval.

END 15300

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Includes:

1. Domestic hot, cold and recirculation water distribution system.
2. Sanitary, vent, storm drainage and natural gas system.
3. Plumbing equipment.
4. Final connection to all equipment unless otherwise noted, requiring water or drainage and supplied in other sections.

1.02 QUALITY ASSURANCE

A. All equipment, materials and installation of such shall be in accord with the Florida Building Code, EPA, and Local Codes (latest editions).

1.03 SUBMITTALS

A. In accord with Section 15010.

B. Product Data:

1. Vent Stacks

1.04 WARRANTY

A. In accord with the General Conditions.

1.05 DEFINITION

A. The term "Piping Below Grade" means buried piping extending approximately 6 inches above the slab on grade to a point not less than 5 feet outside the structure.

PART 2 - PRODUCTS

2.01 SEE SECTION 15060.

PART 3 - EXECUTION

3.01 INSTALLATION OF WATER PIPING INSIDE THE BUILDING

A. The domestic cold, hot water and recirculation piping within the building shall consist of piping connections to:

1. Water service.
2. Hot water circulating pump.
3. Water distribution system.
4. Plumbing fixtures.
5. Water heaters.
6. Equipment provided under other sections.

B. All branches shall be taken off top or bottom of main using 90 degree ells or tees.

C. Provide isolation valves on all branch lines, and to drain sub-systems, and as indicated on drawings. Provide access panel where required.

1. Valve shall be easily accessible.

D. All riser or downfeed drops shall be firmly supported and blocked to prevent hammer due to vibration.

E. Place unions at the following locations:

1. Near each connection to an appliance, fixture or pump, or where indicated for removal of such item.
2. Base and top of a riser more than one story high.
3. Other locations where convenient break-away may be needed.

F. Provide dielectric fittings where connecting copper piping to steel or iron fittings on equipment.

G. All equipment, specialties and accessories, shall be installed per the manufacturer's written recommendations.

3.02 DRAINAGE AND WASTE LINES

A. Where definite slope or gradient is not indicated on the Drawings, pitch horizontal runs a minimum of 1/8 inch per lineal foot.

1. Provide long pattern fittings at all changes in direction.
2. Provide cleanouts where shown on the Drawings, at each change in direction.
3. Use paired 45 degree pipe fittings to accomplish offsets, making due allowance for expansion and contraction.

3.03 VENT STACKS THROUGH ROOF

A. Make new connection to existing vent stacks through roof.

B. Provide pipe increaser immediately below roof, installed so upper end is one pipe size larger than stack.

C. Coordinate roofing and flashing details with Roof Contractor.

3.04 DISINFECTION OF WATER SYSTEM

A. Disinfect the domestic supply and distribution system, and have such system proven free from pollution-causing growths or organisms, before the system can be considered useable. Such disinfection may be accomplished piecemeal, on segments of the overall system as they approach completion, or on the entire system at one time.

B. Disinfection agent and technique shall be in accordance with the Standard State Plumbing Code, (latest edition).

C. Provide the disinfection agent, mixing containers, solution pump, accessory equipment and materials, and manpower for disinfection. Notify the Architect/Engineer at least 24 hours before any disinfection procedure is scheduled and an Architect/Engineer's representative will observe the procedure. Provide sampling and laboratory testing.

D. The disinfecting agent shall be granular or powdered calcium hypochlorite, diluted to a solution of 50 milligrams C1/liter of water. Solution shall be pumped from its drum or other container into the upstream end of the section or system being disinfected, through a disconnected union, unfinished pipe end, or fixture already in place. After the section or system is full of solution and trapped air is purged, the solution shall be held in the pipeline and accoutrements for at least 6 hours. During this time, all valves in the section being treated shall be operated from fully open to fully closed to open again, and pump impellers shall be rotated manually.

E. After retention of disinfecting solution for the designated interval, the upstream end of the section being treated shall be connected in its permanent manner, and the section or system shall be flushed with water supplied from the City main. Samples of water that have flowed through the entire treated section or system shall then be collected for laboratory bacteriological analysis.

F. The system will be considered adequately disinfected when samples collected on 2 consecutive days result in laboratory tests that indicate no evidence of pollution. When repeated test show presence of pollution, repeat the disinfection procedure, until acceptable results are obtained.

G. Alternate agents and methods may be used subject to prior written approval of the Architect/Engineer.

3.05 FINAL CLEAN UP

A. After completion of the plumbing installation, flush out the entire system and thoroughly clean to remove all grit, oil, and foreign materials from the piping.

B. Clean all paint, grease, oil, dirt, labels, and stickers, from all fixtures, equipment and exterior of the piping.

C. Wash and polish all plumbing fixtures, clean and polish all plated surfaces and touch up all mars and scratches on painted and enameled finishes.

D. Clean all grates and strainers on all floor and roof drains.

E. All surplus materials, debris and tools shall be promptly removed from the premises and all damage to other work promptly made good.

3.06 PIPING SCHEDULE

A. Cold and Hot Water, and Hot Water Recirculation, Above Grade

1. See Section 15060

B. Water Supply Below Grade

1. See Section 15060

C. Waste, Soil, Drainage and Vent

1. See Section 15060

D. Sanitary and Storm Drainage Below Slab

1. See Section 15060

END 15400

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Includes:

1. Plumbing fixtures unless otherwise noted.
2. Final connections to plumbing fixtures and equipment requiring water or drain.

1.02 QUALITY ASSURANCE

A. To the largest extent possible, fixtures and faucets and fittings shall be from a single source.

B. All equipment, materials and installation of such shall be in accord with the Florida Building Code, EPA, and Local Codes (latest edition).

1.03 SUBMITTALS

A. In accord with 15010.

B. Product Data:

1. All products specified in this section.

C. Warranty:

1. Electric Water Cooler
2. Electric Water Heater

PART 2 - PRODUCTS

2.01 PLUMBING FIXTURES AND TRIM

A. Refer to plans for make and model numbers of plumbing fixtures.

B. Water Closets:

1. All water closets shall have the following features unless described differently in specific water closet specification paragraph.

a. White vitreous china elongated bowl.
b. Wall mounted with carrier or Floor mounted, bottom outlet with 10" rough-in, as indicated on the plans.
c. Water saving flush design.
d. Passageway for 2 inch sphere, minimum.
e. Open front white seat with self-sustaining stainless steel check hinge, less cover.

f. Exposed pipe, valves, fittings all chromium plated.
g. For Flush Tank Water Closets:

1) Tank: Gravity type with trim. Include cover.
2) Trip Mechanism: Lever-handle actuator.

h. For Flush valve Water Closets:

3) 1-1/2 inch top spud, 1 inch supply drop pipe.
4) Flush valve with vacuum breaker and screw driver stop must be set with centerline of supply 24 inches above top of fixture.

i. Water Closet Acceptable Manufacturers and Models:

1) American Standard
2) Kohler
3) Approved equal.

j. Flush Valve Acceptable Manufacturers and Models:

1) Sloan
2) Zurn
3) Approved equal

2. Barrier Free Water Closet:

a. Same as water closet above except with handicapped seat and handicapped height.

C. Lavatories:

1. All lavatories shall have the following features:

a. Rigid chromium plated supply pipes.
b. Chromium plated angle valve stop on each supply pipe.
c. Chromium plated cast brass waste fitting; 1-1/4 inch P-trap and cleanout
d. Mounting height at each location is dimensioned on the Architectural Drawings, or as directed by the Architect/Engineer.

2. Oval Countertop Lavatory

a. Nominal size 20 inch x 17 inch oval white vitreous china body.
b. Self-trimming countertop mounting.
c. Body Material: Commercial, solid brass.
d. Finish: Polished chrome plate.
e. Maximum Flow Rate: 0.5 gpm
f. Centers: 4 inches Single hole.
g. Mounting: Deck, exposed.
h. Valve Handle(s): Lever.

i. Approved Manufacturers and Models:

1) American Standard
2) Kohler
3) Approved equal.

3. Barrier Free (Wheelchair) Lavatory

a. Nominal size 27 inch x 20 inch white vitreous china body.
b. Gooseneck, self-closing faucet aerator and 4 inch blade handles.

1) Body Material: Commercial, solid brass.
2) Finish: Polished chrome plate.
3) Maximum Flow Rate: 0.5 gpm
4) Centers: 4 inches.
5) Mounting: Deck, exposed.
6) Valve Handle(s): Wrist Blade.

c. Recessed grid drain.
d. Concealed arm, floor mounted carrier.
e. Approved Manufacturers and Models:

1) American Standard
2) Kohler
3) Approved equal.

D. Urinals

1. All urinals shall have the following features:

a. White vitreous china.
b. 2 inch outlet.
c. Fittings and hardware all chromium plated.
d. Mounting height is indicated on Drawings, or as directed by the Architect/ Engineer.
e. Wall hung, siphon jet.
f. 3/4 inch top inlet spud.
g. Rigid chromium plated supply pipe with screw driver angle stop.
h. Flush valve with vacuum breaker.
i. Concealed floor mounted carrier.
j. Urinal Approved Manufacturer and Model:

1) American Standard
2) Kohler
3) Approved equal.

k. Flush Valve Acceptable Manufacturers and Models:

1) Sloan

2) Zurn
3) Approved equal

2. Barrier Free Urinal:

a. Same as urinal, except mounting height shall be 17" above finished floor.

E. Electric Water Coolers: Water coolers shall have a 5-year warranty on refrigeration system.

1. EWC-1 (Wheelchair)

a. Self-contained, wall hung electric water cooler, wheel chair level model.
b. Nominal capacity of 4 GPH of 50°F drinking water with 90°F ambient and 80°F inlet water temperature.
c. Self-closing push bar located in front and side of unit and built-in flow regulator.
d. One piece stainless steel basin and removable drain grid. Unit shall be U.L. listed and meet public health standards.
e. Color shall be as selected by Architect/Engineer from among manufacturer's standard colors.
f. Power Supply: 120V/1O/60Hz.
g. Approved Manufacturers and Models: Subject to compliance with the above specified requirements:

1) Elkay
2) Halsey-Taylor
3) Oasis
4) HAWS
5) SunRoc

F. Drain Fittings:

1. DF-1:

a. Stainless steel sink outlet with basket, strainer and 1-1/2" tailpiece.
b. Stainless steel P-trap with cleanout.
c. Neoprene gasket and locknut.
d. Approved Manufacturers and Models: Subject to compliance with the above specified requirements.

1) Hamilton - 34 L18
2) Chicago Faucet
3) Just - J-15CC

G. Thermostatic Mixing Valve (TMV)

1. Provide a thermostatic mixing valve on the domestic water lines to blend hot and cold water to a desired temperature with the following features:

a. Compensate for pressure changes in water supply.
b. Volume, shut-off control and check valves, dial thermometer (0-200°F) and vacuum breaker on outlet.
c. Inlets and outlets as required.
d. Provide all accessory devices recommended by the TMV manufacturer.

2.02 TRAP PRIMER SYSTEM

A. Trap primers shall consist of distribution units.

B. Distribution units shall have a copper reservoir, brass fittings and a clear plastic inspection cover.

1. Furnish and install the required number of distribution unit needed for connection to FD's.

2. Approved Manufacturers and Models: Subject to compliance with the above specified requirements.

a. Precision Plumbing Products - P-1
b. Approved Equal

C. Piping from distribution units to floor drains shall be 1/2 inch copper pipe and fittings. Provide dielectric unions when connecting dissimilar pipe.

D. Install trap primer system as shown on drawings. Provide and install all necessary fittings, pipe and appurtenances necessary for proper installation and operation of trap primer system.

2.03 FIXTURE SUPPORTS

A. Provide supports for wall hung plumbing fixtures as follows:

1. Urinals, Electric Water Coolers:

a. Chair Carrier: 1-1/4 inch Schedule 40 steel pipe supports (2 required) with cast-iron block feet securely bolted to floor with drilled-in steel expansion anchors, and steel hanger support plate, and bolted bottom bearing plate.

2. Lavatories:

a. Chair Carrier: 1-1/4 inch Schedule 40 steel pipe supports (2 required) with cast-iron block feet securely bolted to floor with drilled-in steel expansion anchors, concealed arm supports with non-slip locking devices.

3. Approved Manufacturers and Models: Subject to compliance with the above specified requirements.

a. Josam
b. Smith
c. Wade
d. Zurn

2.04 WATER HEATER (Electric Commercial)

1. EWH:

a. Minimum 80 gallon storage capacity.
b. Tank shall be glass lined with fiberglass or urethane insulation and enameled steel jacket.
c. 15 KW input, 208v/60 Hz/3ø.
d. Provide immersion thermostats with a minimum of three steps of thermostatic sequences control with 5KW per step maximum.
e. Recovery capacity of 41gallons per hour at 100°F. rise.
f. UL Listing.
g. Electrical features shall include control compartment, magnetic contactors, terminal block, internal fusing and control transformer.
h. Safety control system shall have low water cut-off and high temperature cut-off.
i. Temperature control (140 degrees F. max.).
j. Drain valve.
k. Cathodic protection of heater.
l. Working pressure of 150 psi.
m. 3 year warranty.
n. Approved Manufacturers and Models: Subject to compliance with the above specified requirements.

1) Ruud
2) A.O. Smith
3) State
4) Approved Equal

PART 3 - EXECUTION

3.01 CONNECTION TO PLUMBING FIXTURES

A. Provide soil, waste, vent piping connections; and cold water and hot water piping connections to all plumbing fixtures.

B. Set all fixtures plumb, true to wall lines, and securely fastened in place.

C. Provide reducing bushings at each fixture.

D. Provide angle valve stops at the fixtures on all cold water and hot water supplies.

E. Exposed pipe, fittings, valves and accessory hardware at fixtures, including cold water, hot water and waste piping, and exposed piping at fountains and under-sink cabinets shall be chromium plated. Do not install insulation covering on such piping.

F. Fixture supply pipes may be rigid and may be field-bent to effect offsets. Horizontal and vertical supply pipes shall be straight between pipe bends or angle valves. Offsets shall be made with 1/8 pipe bends.

G. Throughout the building, provide every plumbing fixture having a waste outlet with a standard P-trap at the fixture unless otherwise specified.

H. Join all pipes to fixtures with screwed tailpiece couplings and unions so that fixtures can be easily removed and reset. Provide dielectric unions where connecting copper or bronze fittings or piping to steel or iron fittings or equipment.

I. Provide an escutcheon plate to match the pipe around waste, vent and supply pipes wherever they pass through floors, walls or ceilings.

J. All sinks furnished by Plumbing Contractor shall be furnished with fittings and fixtures by Plumbing Contractor. All sinks furnished by General Contractor shall be furnished with fittings and fixtures by General Contractor as follows:

1. All stainless steel sinks shall have drain fittings DF-1.
2. Plumbing Contractor shall install all fittings and fixtures, whether furnished by the General Contractor or Plumbing Contractor.

K. The Plumbing System and fixtures shall be installed per the Florida Building Code.

3.02 WATER HEATER INSTALLATION

A. Installation shall include:

1. Unions and shut-off valves on supply and discharge piping.
2. Thermometers on supply and discharge piping or supply and discharge headers. See Section 15050 for thermometers.
3. Dielectric unions if connection dissimilar metal piping.
4. Bronze relief valve sized for water heater.
5. Pipe relief valve outlet full size to 6 inches above floor. Discharge of pipe shall flow toward floor drain.
6. Gas connection including manual gas cock, dirt leg, gas pressure regulator and diaphragm gas valve.
7. Flue to be provided by Ventilating Contractor.

3.03 INSTALLATION OF CIRCULATING PUMPS

A. During testing and balancing of the water system, and upon the direction of the Architect/Engineer, trim the impellers of designated pumps.

END 15450